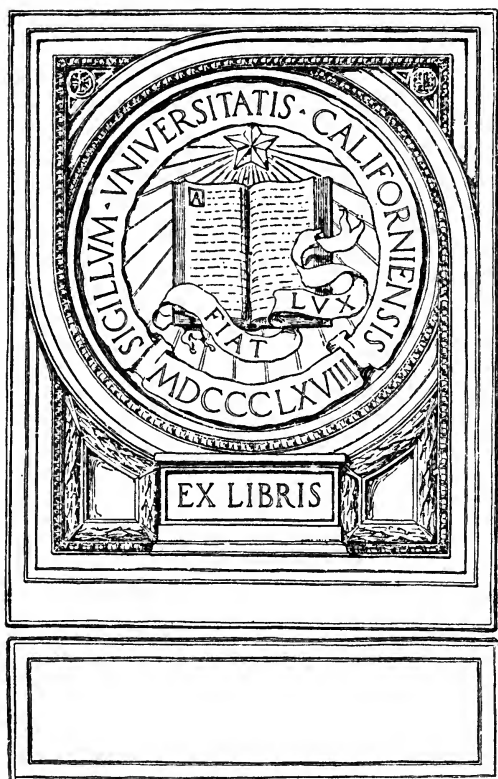


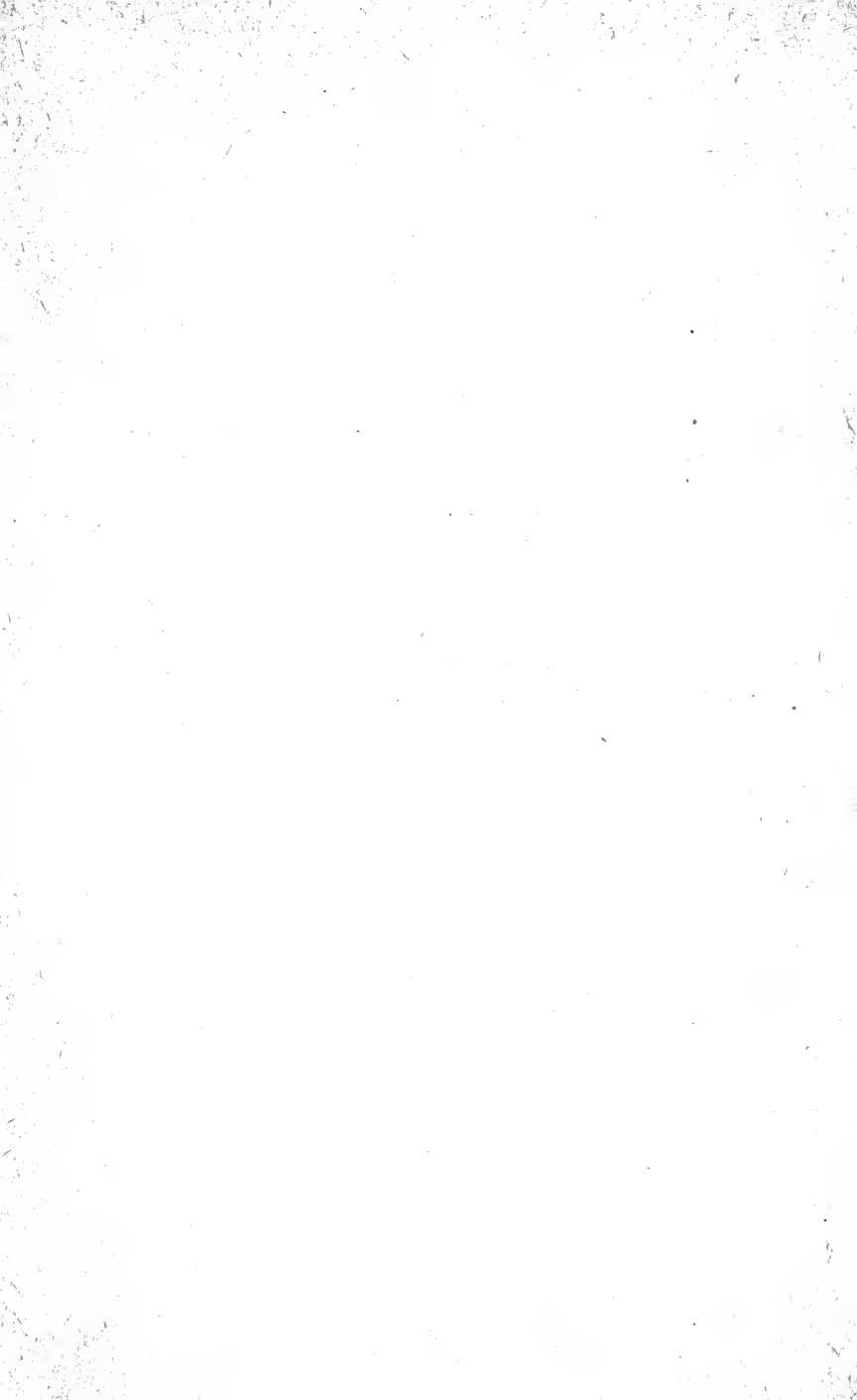
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BUILDING CODE

A COMPILATION OF BUILDING REGULATIONS COVERING
EVERY PHASE OF MUNICIPAL BUILDING ACTIVITY
WITH SPECIAL EMPHASIS ON FIRE
PREVENTIVE FEATURES

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CHICAGO
AMERICAN SCHOOL OF CORRESPONDENCE
1913

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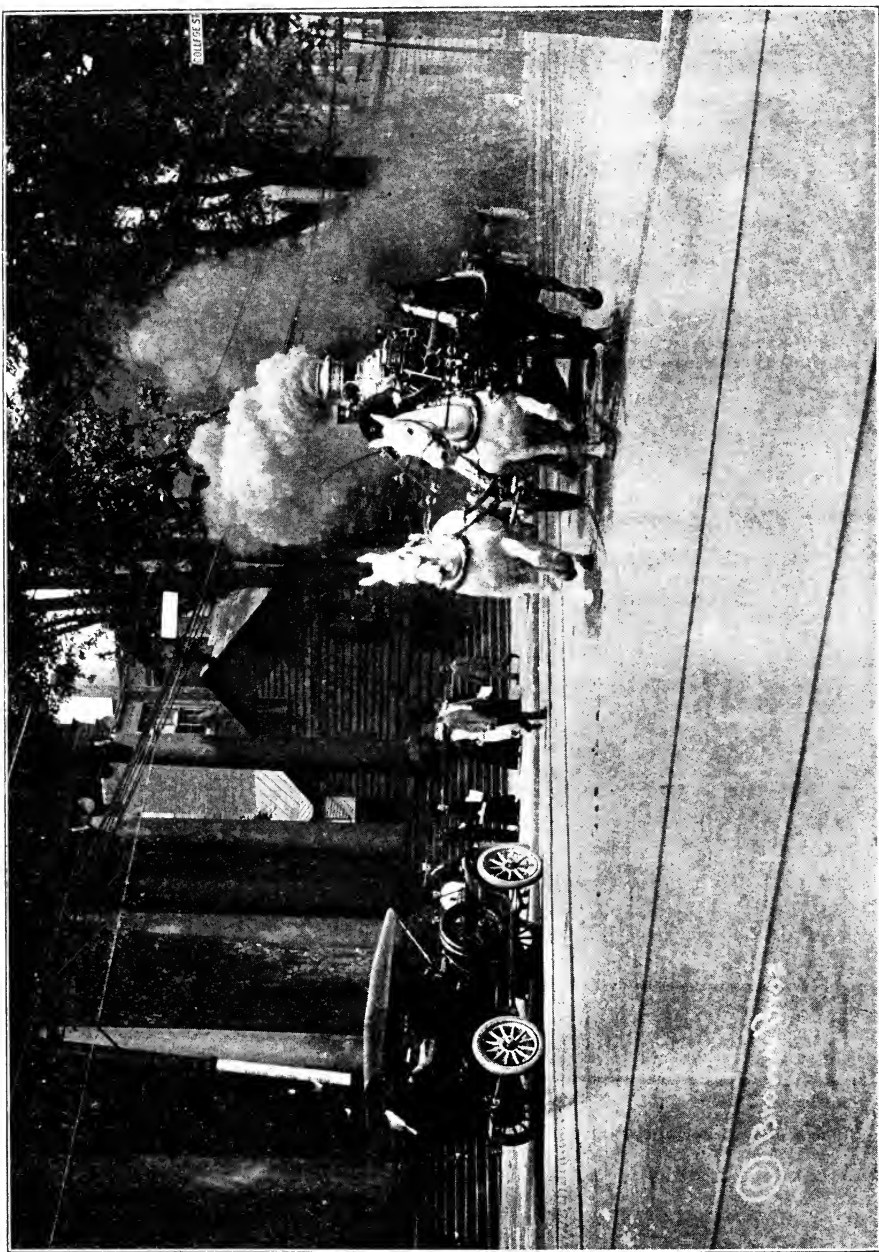
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NO. 101
AMERICAN SCHOOL OF CORRESPONDENCE

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A PASSING TYPE OF FIRE-FIGHTING EQUIPMENT

The Great Distances and Crowded Condition of the Thoroughfares in Our Large Cities Are Bringing About a Rapid Substitution of Motor-Driven Equipment

INTRODUCTION

"FIRE PREVENTION" is a better watchword than "Fire Protection" and a rapidly increasing number of people are beginning to realize it. Town and city councils find that it is better to have buildings in their midst which will not readily catch fire rather than to maintain an expensive fire department to protect fire traps and allow new fire traps to be built in congested localities.

¶ Strange as it may seem, it took years of strenuous effort on the part of the believers in this principle of fire prevention before the movement could gain sufficient headway to become a potential force in the constructive activity of this country. In the end the owner, the architect, and the contractor have had to be compelled by proper municipal legislation to build according to fire prevention specifications before much progress could be made.

¶ The effect of this restrictive legislation is shown in its most complete form in Europe, where the broader area of the congested districts and the scarcity of lumber have forced the problem to its natural solution much earlier than in this country. The wonderfully effective "neighboring risk" idea, by which each owner is made liable for damage to his neighbor's property through fires due to his own carelessness or to the neglect of proper preventive methods, has also helped to stimulate the rapid adoption of the prevention measures, resulting in fire losses per capita in different parts of Europe which are from six to twenty times lower than the figure for this country, and this, too, in the face of a much denser population.

¶ This building code is based upon the best ideas of all the codes heretofore published as well as upon the personal views of the

INTRODUCTION

author, gleaned from a wide experience and a thorough acquaintance with municipal regulations, particularly along fire prevention lines. If in any way the book stimulates the adoption of better municipal regulations and at the same time elevates the standard of building construction from a prevention standpoint, its publication will be amply justified.



HOLLOW TILE RESIDENCE BEFORE STUCCO IS LAID ON
 The Residence Is Shown Complete in the Illustration Given Below
Courtesy of National Fireproofing Company, Pittsburgh



FIREPROOF RESIDENCE OF STUCCO EXTERIOR
 Walls and Floors Are of Natco Hollow Tile. Foundations Are of Concrete. The Building Is
 Thoroughly Fireproof
Courtesy National Fireproofing Company, Pittsburgh



INTERIOR OF MONOGRAM BUILDING, ST. LOUIS, MISSOURI

Albert B. Groves, Architect; Condon and Sinks, Engineers
This reinforced concrete building is built on the paneled ceiling type AKME STYLE

AN ORDINANCE

ENTITLED

"THE BUILDING CODE OF THE CITY OF ———"

CHAPTER I

ADMINISTRATION AND SUPERVISION

- SECTION 1. The name and title of this ordinance shall be "THE BUILDING CODE," and it shall be known and cited as such.
- SEC. 2. The Building Code is hereby declared to be a remedial ordinance and shall be liberally construed, so as to secure the beneficial interests and purposes intended, and shall apply to all parts of the City of ———, hereafter referred to as the "City."
- SEC. 3. The object and scope of this ordinance are the governing and regulating of the construction and erection, remodeling, alteration, repairing, moving and removal, and securing of buildings of any description in the City, and providing for the safety of all present and future buildings, and the safe use of them, and providing for all other matters pertaining to buildings and building operations in said City.
- SEC. 4. It shall be unlawful and subject to the penalties hereinafter provided for any person, persons, firm, or corporation to construct, erect, repair, alter, add to, move or remove any building or portion thereof, or to carry on any building operations in the City, except in compliance with the terms and provisions of this Code.
- SEC. 5. The Building Department shall consist of a Building Commissioner, Board of Advisors, and such Deputies, Engineers, Clerks, and plan and field Inspectors as may be required to properly carry on the work of the Department.
- ¶The Building Commissioner shall be appointed by the Mayor to serve during the latter's administration or during good behavior. He must be a citizen in good standing; an architect, engineer, or master builder of at least ten years' experience as such, and his name must be submitted by

the Mayor to the Council and approved by a majority vote before he can assume the office. His salary shall be fixed by the Council.

¶The Board of Advisors shall consist of the Building Commissioner and the chairman of the Council Building Committee *ex officio*, and one architect, one civil engineer, one sanitary engineer, one master builder, one lawyer, and one merchant. These latter six shall be appointed by the Mayor from among the names of three eligibles that shall be presented by each of the local chapters of the national or, in the absence of national, then the local societies of architects, of engineers, of sanitarians, of medicine, and by the Board of Trade, or the Chamber of Commerce or Commercial Club.

¶The Building Commissioner shall preside at all Board meetings or, in his absence, one of the members present shall be elected *pro tem*. The six lay members shall serve during the pleasure of the Mayor.

¶The Board shall assemble upon the call of the Building Commissioner.

¶The six lay members shall receive a *per diem* compensation fixed by the Council which shall also fix the limit of that compensation during any calendar year.

¶The Deputies and the Inspectors and the other employes of the Department shall be appointed by the Building Department from eligibles presented by the Civil Service and approved by the Mayor. These employes shall be continued in office under the rules of the Civil Service, and their duties and authority will be as prescribed and directed by the Commissioner of Buildings, hereafter called the "Commissioner."

¶The Commissioner's duties will be the administration of the Department and the enforcing of this Code.

¶If situations arise where the Code rulings are doubtful, or in the event of new construction not herein provided for being proposed, or in disputes between the Commissioner and citizens as to the interpretation of this Code, the Commissioner shall convene the Board and submit the matter to it. In all major matters not specifically provided for in this Code the Commissioner may only act with the approval of the Board. Five members present will constitute a quorum.

¶All appointments and discretionary functions, the preparation of amendments to this Code for presentation to Council, and all such matters will be attended to by the "Department," meaning the Commissioner and the Advisory Board, while the mere routine and administration will be done by the "Department," meaning, in such cases, the Commissioner and his duly authorized Deputies and Inspectors.

¶The Board of Advisors shall convene at least six times a year.

SEC. 6. The Building Department shall have the authority to stop the construction of any building, or the making of any alterations or repairs of any building, within said City, when the same is being done in a reckless or careless manner, or in violation of this Code or any ordinance of said City, and to order, in writing or parole, any and all persons in any way or manner whatever engaged in so constructing, altering, or repairing any such building, to stop and desist therefrom, and to have the authority in the case of any building or part thereof being in an unsafe condition, and so that said unsafe condition may be averted by the immediate application of precautionary measures, to cause such precautionary measures to be taken and all work necessary to render said building, or any part thereof, safe to be done, after having served written notice upon the owner, lessee, occupant, or agent of said building, personally.

¶The said Building Department shall have authority to direct the fire department, after written notice has been served upon the owner, lessee, occupant, or agent, personally, or without such notice if delay in serving such notice would in its opinion imperil the public safety, to tear down any defective or dangerous wall, stack, chimney, or any building or any part thereof, or in case of the destruction or partial destruction by fire, or by the action of the elements, any part of the building left standing, that is in its opinion unsafe, and it shall be the duty of the fire department to execute said order forthwith; and said Building Department shall immediately after such removal make report in detail to the Mayor and to the owner, giving in detail the conditions necessary for such action; and if the owner of such building is a non-resident of the City, a copy of such report shall be sent to his last known address, and a like copy served upon his agent or lessee of such premises.

¶The said Building Department is hereby empowered and whenever in its judgment occasion may require its inspectors or other officers, to enter into and upon any building, staging, other structure, or premises for the purpose of examining the same in relation to its proper ventilation, sanitation, and safety, and may make such orders in reference thereto as to them seem proper to the fulfillment of the provisions of this Code; and may make examinations of any buildings or premises to investigate divergence from or failure to comply with the provisions of this Code. And if the owner or lessee of such building, staging, or structure shall fail or neglect to comply with the requirements of such orders, the said Building Department may enter upon such premises, hire necessary help, and perform such work as is necessary in its judgment to be immediately performed so as to secure public and private safety. The expense so incurred shall be a lien on the property, and if the same remain unpaid sixty days

or more after legal notice, which shall be given by the City Auditor, that the same is due, an addition of three-quarters of one per centum shall be made to the amount of such assessment or expense for each month the same shall so remain unpaid after said lien is filed, and the same shall be collectable as a part of such assessment or expense, and be and remain a lien on such property in like manner and subject to the same modes of enforcement and collection as the principal sum to which the same is added; but said assessment shall be without prejudice to the right which the owner may have to recover from any lessee or other person liable for repairs.

SEC. 7. Before the erection, construction, or alteration of any building or part thereof, or shed, extension, or piazza is commenced, the owner, architect, or builder shall file with the Department a clear statement in writing of the proposed improvement, building, or alteration—together with a copy of the plans and specifications of the same, except where the cost as estimated by said Board does not exceed one hundred dollars—which statement shall show the size and map of the land upon which the structure referred to is to be erected or altered, and the distance of such proposed erection, alteration, or construction from the street line and from adjoining buildings on the same or adjacent lands or lots, a record of which shall be kept in the office of said Department.

¶Wherever plans are required for a building, addition, or detail, elevator, plumbing, etc., they shall be made by a reputable, responsible, and known architect, engineer, or specialist in the particular line of work planned. Plans by a carpenter for a house or drawings by a steam fitter for an elevator, for instances, will not fill this requirement.

¶Further, in making application for a permit the architect or engineer shall declare and sign a certificate that the work called for is in accordance with the spirit and letter of this code. Should it appear that any architect or engineer or specialist has made false statements in this form of application and that the work proposed is not in accord with this Code, then the Department may thereafter refuse to issue any further permits upon applications signed by him. This refusal, however, may only be made after he has been heard in his own defense before a meeting of the Advisory Board.

¶No part of any building shall extend beyond the building line and on street, except bay windows, cornices, and galleries above the first story or 10 feet clear above the grade line, and such projection beyond the building line shall not exceed 3 feet, provided, however, that in no case shall any building or part of a building extend beyond the street line, excepting

that anywhere above the second story the main roof cornice may project 24 inches and all minor cornices or belts 12 inches, and in buildings of 8 stories or more the main roof cornice may project 36 inches over the street line.

¶And the erection, construction, or alteration of such building or part thereof—shed, extension, or piazza—shall not be commenced or proceeded with until the said owner, architect, or builder shall receive a certificate or permit from said Department after an examination into such plans and specifications. And after it is satisfied that such sufficient means of fire protection, ventilation, sanitation, and general construction as therein described are provided as are conducive to safety and sanitation and are otherwise as provided in this Code, it shall issue said permit. Said plans and specifications shall remain on file at the office of the Building Department.

CHAPTER II

PLANS, FEES, PENALTIES, AND LICENSES

SEC. 8. All working plans and drawings other than diagrams, which are to be filed with the Building Department as provided in this Code, shall be drawn to a scale of not less than one-eighth of an inch to the foot on paper or cloth, in ink or by some process that will not fade or obliterate. All distances and dimensions must be accurately figured and drawings made explicit and complete, showing the sewerage and drain pipes, and location of all plumbing fixtures within such building. Each set of plans presented for permit must be accompanied by specifications describing all materials to be used in the proposed building, and both the plans and specifications must be approved by the Building Department before a permit is granted. Special drawings and details to illustrate any particular point or points shall be furnished when required.

SEC. 9. It shall be unlawful and subject to the penalties hereinafter provided to erase, alter, or modify any line, figures, or coloring contained upon drawing or specifications that in any way affect the structural, sanitary, or essential features of a building after they have been stamped by the

Building Department or filed with it for reference. If, during the progress of the execution of such work, it is desired to deviate in any manner affecting the construction or other essentials of the building from the terms of the application, drawings, plans, or specifications, as filed, notice of such intention to alter or deviate shall be given in writing to the Building Department and its written assent must be obtained before such alterations or deviations may be made. Alterations or deviations in buildings, which do not involve any change in their structural or sanitary parts or ways of ingress or egress, mere matters of decoration, may be made without permission from said Department.

SEC. 10. When the cost of any building alteration, elevator, plumbing, fire escape, or addition thereto, as herein specified, as estimated by the Building Department, does not exceed the sum of five hundred dollars, the fee for the permit, as provided in this Code, shall be one dollar; when the cost as so estimated is between five hundred dollars and two thousand dollars, two dollars; and when the cost as so estimated, is in excess of two thousand dollars, two dollars plus twenty-five cents for each one thousand dollars or fraction thereof in excess of two thousand dollars.

¶Further, in any case where it is decided to build a better class of building than called for in the limits wherein it is to be built and for the purpose it is intended, then the fee for the building permit shall be remitted wholly after the building is completed. But this can be done only upon the direction of the Advisory Board, the sole judge of the merits of the contention that the building is really better than is required by the Code for that district of the City. This is done for the purpose of encouraging better building in the City.

SEC. 11. And further, all new buildings shall be conspicuously labeled, at or near the entrance, just as to what class of construction they are—whether “fireproof,” “slow-burning,” or “ordinary”—and all old ones of a public or semi-public nature—halls, theaters, stores, hotels, apartments, etc.—shall be similarly labeled. In connection with these old structures there shall be an additional classification “dangerous.” These labels shall be different in colors, so that each class is easily recognizable, and shall be affixed by the Building Department as quickly as it is possible to make the necessary inspection. All appeals will be heard and settled by the Advisory Board. It shall be a punishable offense to in any way hide or mar these signs or to advertise or call or distinguish the building by any superior classification than that which it has been labeled by the Department.

¶If, after a permit for the erection, alteration, or repair of any building

shall be granted, the operation called for by said permit shall not be commenced within six months from the date of said permit, a new permit shall be taken out by the owner or his agent and the fees herein fixed for the original permit shall again be paid therefor before any work on any such building is carried on or commenced; unless the commencement of such work has been delayed on account of strikes or such unavoidable occurrence, of which the Building Department shall be the sole judge.

SEC. 12. The said Building Department shall have authority to order stopped and suspended any and all work or building operations of any character whatsoever, which it deems being done or constructed in a careless, unsafe, or insanitary manner; and if the orders of said Department are not obeyed and the work so stopped or suspended, the contractor, foreman, person, or persons so disobeying such orders shall be liable to arrest, and upon conviction in the City Court of said City shall be fined not more than one hundred dollars, or imprisoned in the County Jail not more than six months, or both; provided, however, that any person who deems himself aggrieved by such order or orders of any of the Inspectors of the Department shall have the right of appeal to the Building Department for a hearing before the Board of Advisors, which hearing the said Department shall order and hold within at least three days of the service of the aforesaid order, at which time the said Board shall hear the parties in interest, inquire into the facts, and render such decision as to it seems meet and proper; but, pending such hearing and the rendition of said judgment or decision, all building operations and work complained of as aforesaid shall be suspended and held in abeyance, under the penalty hereinabove provided.

SEC. 13. Further, any person, persons, or corporation desiring to engage, or being engaged in the business of contracting and building, before receiving a license to do so (and no construction work shall be done by other than a licensed builder) shall file in the office of the Building Department a petition in writing, giving the name of the person, persons, firm, or corporation, and the place of business of said person, persons, firm, or corporation, petitioning to become licensed builders or contractors, and agreeing that he or they will abide by the rules and regulations of the Building Department and the City Ordinances, and furnishing evidence that he is or they are perfectly competent to carry on such construction work. Before receiving a license the applicant shall execute and deposit in the office of the Building Department a good and sufficient bond payable to the City to be approved by said Building Department, in the sum of \$3,000 conditioned that said applicant will indemnify and save harmless the City and the Building Department of and from all accidents or dam-

ages caused by him or them in any work done by virtue of his or their said license. Said petition shall be accompanied by a license fee of 20 dollars, to be paid into the treasury of the City, whereupon said Building Department shall issue to said applicant a license to engage in the business of master builder or contractor, or master builders or contractors.

CHAPTER III

FIRE LIMITS

SEC. 14. The Council shall establish a line which shall be a limit about the most congested and important section of the City, and the blocks contained within these limits shall be known as the "Inner Fire Limits."

¶This section shall be within another and larger one similarly established by the Council, upon the recommendation of Building Department, City Engineer, and Fire Department, that shall be known as the "Outer Fire Limits."

¶The space between this outer line and the city's limits of jurisdiction shall be known as the "Boundary Limits."

SEC. 15. No person, firm, or corporation shall hereafter erect any building or addition to a building within the Inner Fire Limits, as the said limits now are or may hereafter be established, unless said building be of fire-proof construction as provided in this Code.

¶No person, firm, or corporation shall erect, enlarge, elevate, alter, or otherwise change any building or addition to a building within the Outer Fire Limits, as the said limits are now or may hereafter be established, unless the outer walls and the covering of the roof be composed wholly of non-combustible materials, and the use of sheet metal for the covering of outside wooden walls of buildings within the Outer Fire Limits is prohibited. Nothing herein, however, shall be understood to prohibit the use of tar or asphalt and gravel, or slag and asbestos roofs, but such roofs must be approved by the Building Department.

SEC. 16. All exposed windows in the inner fire district, except windows facing on streets over thirty feet wide, shall be protected by standard,

fire-resisting shutters or by metal window frames and metal sash glazed with wire glass.

SEC. 17. Outside the Fire Limits when any brick, stone, or concrete building is to be erected of a class that could, under this Code, be constructed of wood, the Building Department is hereby authorized, empowered, and directed to allow reasonable modifications of this Code relating to brick, stone, or concrete buildings in consideration of incombustible material being used voluntarily for walls instead of wood.

SEC. 18. In the matter of what is and what is not combustible construction, as in all the terms used in this Code, it has been sought to use the simplest and plainest definitions, those understood and in common use in this vicinity. So also in the matter of construction, it is aimed to define construction, sizes of brick, measurements, and such matters that conform to common usage and custom and mode in vogue in this vicinity. But, in the case of any dispute, or if the Advisory Board itself be in doubt, then Kidder's Building Hand-Book will be the deciding authority as to all such disputed terms.

CHAPTER IV

QUALITY OF MATERIALS

SEC. 19. All materials shall be of quality suitable for the purpose for which they are intended to be used and conform to trade and manufacturers' standards. Each material must be free from imperfections whereby its strength or durability may be seriously impaired.

TESTS

¶The Building Department shall have the authority to reject materials which are unsuitable and below the usual standards, and may require tests to be made at the expense of the architect, engineer, builder, or owner to determine the strength of any structural materials.

¶In all such major tests prescribed in this Code the same shall be made by the National Bureau of Standards at Washington, D. C., or the Under-

writers' Laboratory at Chicago. Or, if these Laboratories be too busy to attend to the matter within the time required, the tests may be made by some State or private laboratory of recognized standing and proper equipment that may be recommended and approved in writing by either and the manner of making the test will be according to the instructions of said Bureau of Standards. All such tests are to be paid for by the owner or his engineer or manufacturer—in no case by the City—but shall be directed, called for, and, if necessary, supervised by the Building Department.

¶In case such materials or systems of construction have already been tested by either of these two laboratories, then the Department may accept its report in lieu of an additional or new test especially for the City.

BRICK AND STONE

SEC. 20. Brick shall be well burned and hard. When old bricks are used they shall be thoroughly cleaned. When the season will permit, bricks shall be wet before using.

¶No soft bricks shall be used in any part of a building exposed to the weather or in any internal or external piers, nor in any part of a wall where there is a greater height than 40 feet of wall above said brick. The bond of brick work shall be formed by laying one course of headers for at least every six courses of stretchers or the equivalent of such bonding. All stone and brick work over openings exceeding 4 feet in width shall be supported with stone or iron or concrete lintels of sufficient strength to carry the superimposed weights, excepting where such stone or brick work shall be supported with substantial stone or equally strong arches. All lintels supporting stone or brick work must bed on stone, brick, concrete, or iron of sufficient strength.

SEC. 21. Stone shall be sound and hard and of sufficient dimensions for its intended use.

SEC. 22. Sand used for mortar shall be clean, sharp grit sand free from loam, dirt, or organic matter.

SEC. 23. Lime shall be thoroughly burned quick lime of good quality and well slacked before using.

SEC. 24. Any natural cement which is a product of calcination of natural rock, such as Akron, Louisville, and other hydraulic cements and slag Portlands, will be classed as "natural cement."

SEC. 25. Standard Portland cement of commerce, either domestic or foreign, shall be capable of passing the requirements as set forth in the "Standard

Specification for Portland Cement," by the American Society for Testing Materials. The medium requirements for tensile strength for briquettes 1 inch square in section shall be as follows, and there shall be no retrogradation in the strength between the periods specified:

Neat Cement	Strength
24 hours in moist air.	200 lbs.
7 days (1 day in moist air, 6 days in water).	550 lbs.
28 days (1 day in moist air, 27 days in water).	650 lbs.

¶For fireproofing and floor construction the highest grade of Portland shall be used. It shall be of uniform consistency and of such fineness that not more than ten per cent will be rejected by a sieve of twenty-five hundred meshes per square inch, and be subject to such other physical and chemical tests that the Building Department may require.

SEC. 26. A properly proportioned mixture of lime and sand—not more than three parts sand to one part unslacked lime—will constitute lime mortar.

SEC. 27. A properly proportioned mixture of cement and sand with lime added—not more than four parts sand to one part each of dry cement and slacked lime—will constitute lime and cement mortar.

SEC. 28. A properly proportioned mixture of cement and sand—not more than four parts sand to one of Portland cement, not more than three parts sand to one of Rosendale cement—will constitute cement mortar. The test for the same shall be as follows:

One part cement, 3 parts standard sand	Strength
7 days (1 day in moist air, 6 days in water).	175 lbs.
28 days (1 day in moist air, 27 days in water).	300 lbs.

SEC. 29. Mortar for plastering shall be made as follows or equally well: The mortar shall be slacked, made into putty, and cooled before putting in the hair which must be well separated. One bushel of hair will be required for every three barrels of putty; one and one-half barrels of sand to one barrel of putty may be mixed for the first or scratch coat, after being thoroughly mixed as above. The said mixture must be stacked for at least three days before using. The said mortar shall be used on lath surfaces with a second coat of mortar in which are two and one-half barrels of sand to one barrel of putty and less hair.

¶Patent plasters may be used with the approval of the Department.

CONCRETE

SEC. 30. When the structural use of concrete is proposed, a specification stating the quality and proportion of materials and the methods of mixing

the same shall be submitted to the Building Department and approved by it before the work shall be carried on.

¶Concrete for foundations shall be made of at least one part cement to three parts of sand and five parts of clean broken stone, free from dirt and dust, of such size as to pass in any way through a 2-inch ring, or good clean gravel may be used in the same proportion as broken stone.

¶The ingredients of the concrete shall be thoroughly mixed to the desired consistency and the mixing shall continue until the cement is evenly distributed and the mass is homogeneous and uniform in color. Methods of measurement of proportions of the various ingredients, including water, shall be used, which will secure separate uniform measurement at all times.

¶Where the conditions will permit a machine mixer of a type which insures a proper mixing of the materials throughout the mass shall be used.

¶When it is necessary to mix by hand the mixing shall be on a water-tight platform and special precaution must be taken to turn the materials until they are homogeneous in appearance and color.

¶The materials must be mixed wet enough to produce a concrete of such consistency as will flow into the forms and about the metal reinforcement and which on the other hand can be conveyed from the mixer to the forms without separation of the coarse aggregate from the mortar.

WOOD

SEC. 31. All timber and wood shall be of good sound lumber free from rot, large or loose knots, shakes, or any imperfections whereby the strength may be impaired, and be of such size and dimensions as the purposes for which the building is intended require.

STRUCTURAL IRON AND STEEL

SEC. 32. All structural wrought or cast iron or steel, in quality, in requirements of tests, in workmanship, and in assemblage and interconnections of shapes, shall be in accordance with the standard specifications of the Association of American Steel Manufacturers, as given in the hand-books of the respective standard manufacturers; provided that for buildings of skeleton-frame fireproof construction, the Building Department may, at any time, require the owner to engage recognized experts who shall supervise the mill, shop, and field work, and who shall file certified copies of their reports on the progress of the work for the approval of said Building Department; and no work shall be concealed or built upon until the Building Department has been furnished satisfactory proof that it is up to the accepted standard and properly painted or protected.

¶All wrought iron shall be uniform in character, fibrous, tough, and ductile.

It shall have an ultimate tensile resistance of not less than forty-eight thousand pounds per square inch, an elastic limit of not less than twenty-four thousand pounds per square inch, and an elongation of twenty per cent in 8 inches, when tested in small specimens.

¶ Wrought iron shall be tested full sized as rolled when called for by the Building Department. Specimens not more than 1 inch in thickness should bend double when cold, without showing cracks or flaws.

¶ All structural steel shall have an ultimate tensile strength of from fifty-four thousand to sixty-four thousand pounds per square inch. Its elastic limit shall not be less than thirty-two thousand pounds per square inch, and test specimens, ruptured in tension, must show a minimum elongation of not less than twenty per cent, with from fifty thousand to fifty-eight thousand pounds per square inch.

¶ Cast steel shall be made of open hearth steel containing one-quarter to one-half per cent of carbon, not over eight one-hundredths of one per cent of phosphorus, and shall be practically free from blowholes.

¶ Cast iron shall be of good foundry mixture, producing a clean, tough, gray iron.

¶ The quality of the iron going into castings under specifications shall be determined by means of the "Arbitration Bar." This is a bar $1\frac{1}{4}$ inches in diameter and 15 inches long. Two sets of two bars shall be cast from each heat, one set from the first and the other set from the last iron going into the castings. Where the heat exceeds twenty tons, an additional set of two bars shall be cast for each twenty tons or fraction thereof above this amount. In case of mixture during the heat, one set of two bars shall also be cast for every mixture other than the regular one. Each set of two bars is to go into a single mould. The bars shall not be rumbled or otherwise treated, being simply brushed off before testing.

¶ The transverse test shall be made on all the bars cast, with supports 12 inches apart, load applied at the middle, and the deflection at rupture noted. One bar of every two of each set made must fulfill the requirements to permit acceptance of the castings represented.

¶ The bottom of the bar is $\frac{1}{16}$ of an inch smaller in diameter than the top, to allow for draft and for the strain of pouring. The pattern shall not be rapped before withdrawing. The flask is to be rammed up with green moulding-sand, a little damper than usual, well mixed and put through a No. 8 sieve with a mixture of one to twelve bituminous facing. The mould shall be rammed evenly and fairly hard, thoroughly dried and not cast until it is cold. The test-bar shall not be removed from the mould until cold enough to be handled.

SEC. 33. All structural material of whatever nature shall be subjected to tests to determine its character and quality by methods established by the authorities already prescribed; the tests shall be made under the supervision of the Building Department if it deems that supervision necessary or it may direct the owner to file with it a certified copy of the results of such tests as they may direct. No new structural material shall be used in any structure until it has been properly tested and found to fulfill the minimum conditions and tests required by this Code for materials used for like purposes.

SEC. 34. The stresses used in materials hereafter to be used in construction shall be the calculated stresses due to their "dead load" plus the applied "live load." The allowable factors or units of safety or the dimensions of each piece or combination of materials required in a building or structure, if not given in this Code, shall be ascertained by computation according to the rules prescribed by the standard modern authorities on strength of materials, applied mechanics, and engineering practice, provided that the Building Department may, and in cases of trussed or reinforced concrete buildings two or more stories high, shall require the owner or architect or engineer to submit a certified copy of such computation or strain sheets for examination and approval with the application for the Building Permit.

CHAPTER V

FACTORS OF SAFETY

SEC. 35. In computing the working stresses in the framing of any building, unless the safe loads are prescribed in this Code, the following factors of safety shall be used, these factors to be increased where there is a vibrating load:

¶ For wrought iron or steel subject to compression or tension or transverse strains.	4
¶ For cast iron subject to tension or transverse strains.	10
¶ For cast iron subject to compression for plates and columns of ordinary or short length—according to the uniformity of the thickness of shell . .	6 to 8
¶ For cast iron long columns—according to the uniformity of the thickness of shell	8 to 10
¶ For timber compressions in short columns or posts	4
¶ For timber subject to tension and transverse strain	6
¶ For timber in long columns or posts	5
¶ For natural or artificial stone or masonry or concrete	10
¶ For framed structures composed of two or more pieces of the same material, or a combination of two or more pieces of different materials, such as frames of all kinds, brackets, cantilevers, trusses, and arched floors or reinforced concrete floors combined with metal girders, beams or channels, under ordinary loading of buildings	4
¶ For framed structures as above exposed to vibrations of machinery or trucking or shocks, or exposed to the action of the elements	5
¶ For floors or arch construction of brick, concrete, or tile, or similar bearing parts between beams	6
¶ For floors of reinforced concrete construction or concrete and tile, or reinforced tile, or similar bearing parts between beams.	5
¶ For iron or steel in latticed or open worked columns or latticed beams or girders when solidly filled or encased in concrete extending at least 2 inches beyond the outer edges or faces of the structural members (with no allowance for the concrete)	3

SEC. 36. Every temporary support under any structure, wall, girder, or beam, during the erection, finishing, alteration, or repairing of any building or structure or any part thereof, shall be of sufficient strength to safely carry the load to be placed thereon, allowing a factor of safety of not less than five.

¶During the construction or alteration of any building or structure, no material entering into such construction or alteration shall be placed on any floor or roof of any greater weight than the live load that each such floor or roof is intended to safely sustain when the building or structure is completed.

CHAPTER VI

CALCULATION OF STRESSES

EARTH AND FOUNDATION LOADS

SEC. 37. Sound, natural earth shall not be loaded to more than the following in tons per square feet:

Gravel and coarse sand, well compacted or hard pan . .	6 tons
Hard rock.	20 "
Fairly hard rock.	6 "
Dry, hard clay or fine sand.	4 "
Moderately dry clay or moderately compact sand.	2 "
Soft sand or clay or undisturbed alluvial soils.	1 ton

¶No foundation shall be started on filled ground until proper tests have been made under a skilled engineer and permit granted by the Building Department. When a doubt arises as to the safe sustaining power of the earth upon which a building is to be erected, the Building Department may order borings to be made, or direct that the sustaining power of the soil be tested by and at the expense of the owner of the proposed building.

SEC. 38. Allowable safe load in tons per square foot, Table I.

TABLE I
Foundation Loads

Laid in Mortar	Lime	Lime and Portland Cement	Hydraulic Cement	Portland
Common Kiln Run Brick	6	8	10	13
Common Selected Hard Brick	6	10	12	16
Hard Pressed Hydraulic or Vitrified Shale or Paving Brick	6	12	14	18
Stone (Rubble, Irregular Bonded)	4	5	7	10
Stone (Ashlar or Block with full beds)	6	12	15	20
Concrete (Cement 1, Sand 2, Stone 4)			8	16
Concrete (Cement 1, Sand 2, Stone 5)			6	14
Stone, Rubble, Coursed, and Well-bonded	6	7	9	11

INACTIVE AND LIVE LOADS

SEC. 39. In columns, girders, timbers, walls, and materials, the stresses and loads allowed shall be those accepted in general practice, recognized by the best authorities, and defined by Kidder or such accepted textbooks. So in the live loads calculated for floors, stairs, galleries, etc., the minimum generally accepted shall obtain and the different classifications shall be according to Kidder or such accepted text books, provided, however, that no floor or stair or gallery or roof shall be calculated for less than 40 pounds live load per square foot of surface.

¶Also the architect or engineer of any building may be required to present his calculations for such stresses, loads, etc., in such form that they may be readily checked by the Department, and the work shall not proceed until the Department approves of such loads, etc.

¶Wherever the load may be a shifting or a moving or a vibrant one—for example, in machine shops, factories, drill halls, or churches—or wherever a crush of people may occur, the live loads shall be calculated at 33 per cent additional live load over and above an inactive live load such as in a warehouse, a home, or a museum.

SEC. 40. The Building Department shall estimate the live loads allowable under any construction that may be proposed; these loads shall be marked upon the plans and the owner of the building shall conspicuously label and post these same loadings in his building. And at no time shall the floors be loaded in excess of that allowed maximum. If the building is to be changed as to its nature of occupancy and additional loads be desired, then the floors shall be reinforced under the direction of the Department.

¶The Department shall also, as rapidly as possible, determine the floor loads allowable in all existing buildings, where in its belief overloading may now obtain, or where it is evident that such overloading might result disastrously to life and adjacent property. The buildings so examined shall be labeled in the same manner as the new ones, as to allowable loads, and such floors shall not be overloaded under the penalties provided for other similar offenses. The Building Department shall have police authority for the enforcement of this and all other clauses of this Code, and for all infractions of the same it shall cite the owner or builder or their representatives before the proper Court, there to be dealt with as that Court shall decree imprisonment or fine or both as the importance of the offense shall, in the opinion of the Court, justify.

¶In such prosecutions or in any defense the Department may be called upon to make, it shall have the assistance, help and advice of the City Attorney.

CHAPTER VII

EXCAVATIONS

SEC. 41. All excavations for buildings shall be made at least 9 inches beyond the line of masonry to permit of inspection and shall be properly guarded and protected by the person, persons, or corporations causing the same to be made, so as to prevent the same from becoming dangerous to life and limb, and shall be sheath piled where it may be necessary, or by some other method approved by the Building Department to prevent the adjoining soil from caving in, by reason of its own weight or by reason of any weight that may rest upon it.

SEC. 42. Whenever any excavation is made on land adjoining a building, the owner of the land upon which such excavation is made shall shore up, protect, and take every precautionary measure to protect and save from injury or harm all footings, foundations, walls, or parts thereof, or any part of the building, which is liable to be injured by reason of such excavations, provided the depth of such excavation exceeds 6 feet below grade. If such excavation does not exceed 6 feet, then any such expense shall be borne by the owner of such building.

SEC. 43. Plans filed with the Building Department shall be accompanied by a statement of the character of the soil at the level of the footings found by test-borings.

SEC. 44. When buildings to be erected or altered front on business thoroughfares and in congested business districts the Building Department may require that sidewalk traffic be maintained without interruption by means of elevated or covered sidewalks, and such covering shall be strong enough to protect passers-by from falling material, and everywhere all temporary inclosing fences and sidewalks, etc., shall be kept clean and all traffic shall be interfered with as little as possible. In all these matters the orders of the Department must be promptly obeyed. Sufficient lights and guards shall be maintained at all such obstructions or excavations. The street proper is to be kept clear, save the temporary sidewalk, 3 feet wide, that may be built beyond the curb line.

CHAPTER VIII

FOUNDATIONS AND FOOTINGS

SEC. 45. Every building except buildings erected upon solid rock, shall have foundations of brick, stone, steel, iron, or Portland cement concrete, laid not less than 4 feet below the surface of the earth on solid ground, on level surface of rock, or upon wide footings, reinforced concrete beds, piles, or ranging timbers, when solid earth or rock is not found. Piles intended to sustain a wall, pier, or post shall be driven to a solid bearing, if practical to do so, and the number of such piles and their dimensions shall be sufficient to support the superstructure proposed.

SEC. 46. The Building Department shall be notified of the time when test piles shall be driven. The tops of all wooden piles shall be cut off below the lowest water line. When required, concrete shall be rammed down in the interspaces between the heads of the piles to a depth and thickness of not less than 12 inches and for 1 foot in width outside of the piles.

SEC. 47. Where ranging and capping timbers are laid on piles for foundations, they shall be of hard wood not less than 6 inches thick and properly joined together, and their tops laid below the lowest water line.

SEC. 48. Where metal is incorporated in, or forms part of, a foundation it shall be thoroughly protected from any rust by asphaltum, concrete, or by such materials and in such manner as may be approved by the Building Department. When footings of iron or steel which form columns are placed below the water level they shall be similarly coated and inclosed in concrete for preservation at against rust.

SEC. 49. When foundations are carried down through earth by piers of stone, brick, or concrete in caissons, the loads and mode of construction and manner of doing shall first be approved by the Building Department and, if need be, this or any other specially important work may be permitted only under the superintendence of the Department.

SEC. 50. Foundation walls shall be built of stone or brick with cement mortar, or of Portland cement concrete, except foundations for frame buildings and private stables and for buildings not more than two stories in height, which may be built with lime and cement mortar. If built of Portland cement concrete, they shall be at least 4 inches thicker than the wall next above them in a depth of 12 feet below the curb level and for every additional 10 feet or part thereof deeper, they shall be increased 6 inches in thickness. The footing or base course shall be of stone or concrete, or both, or of concrete and stepped-up brickwork of sufficient thickness and area safely to bear the weight to be imposed thereon.

SEC. 51. If the footing or base course be of concrete, the concrete shall not be less than 12 inches thick. If of stone, the stone shall not be less than 16 inches by 24 inches and at least 6 inches in thickness for walls, and not less than 8 inches in thickness for piers, columns, or posts. The footing or the base course, except under framed buildings, whether formed of concrete or stone, shall be at least 8 inches wider than the bottom width of walls, and at least 6 inches wider on all sides than the bottom width of the said piers, columns, or posts. If the superimposed load is such as to cause undue transverse strain on a footing projecting 6 inches, the thickness of such footing shall be increased so as to carry the load with safety, by adding extra course or courses of above dimensions. All base stones shall be well bedded and laid crosswise edge to edge.

¶If stepped-up footings of brick are used in place of stone above the concrete, the offsets, if laid in single courses, shall not exceed $1\frac{1}{2}$ inches, or if laid in double courses, shall not exceed 3 inches, the first course of brickwork being set back one-half the thickness of the concrete base, so as properly to distribute the load to be imposed thereon.

SEC. 52. If, in place of a continuous foundation wall, isolated piers are to be built to support the superstructure, where, in the opinion of the Build-

ing Department, the nature of the ground and character of the building make it necessary, inverted arches resting on a proper bed of concrete, both designed to transmit with safety the superimposed loads, shall be placed between the piers. The thrust of the outer piers shall be taken up by suitable wrought iron or steel rods and plates.

SEC. 53. Grillage beams of wrought iron or steel resting on a proper concrete bed may be used. Such beams must be provided with separators and bolts, inclosed and filled solid between with concrete, and of such size and so arranged as to transmit with safety the superimposed loads.

SEC. 54. All stone walls 24 inches and not less than 18 inches in thickness shall have at least one header extending through the wall in every 3 feet in height from the bottom of the wall, and in every 3 feet in length; and if over 24 inches in thickness, shall have one header for every 6 superficial feet on both sides of the wall, laid across each other to bond together, and running into the wall at least 20 inches. All headers shall be at least 12 inches in width and 6 inches in thickness and shall consist of good flat stones.

¶No stone shall be laid in such walls in any other position than on its natural bed. No stone shall be used that does not bond or extend into the wall at least 6 inches. Stones shall be firmly bedded into cement mortar and all spaces and joints thoroughly filled.

SEC. 55. External retaining walls shall be constructed of sufficient thickness to safely support the outside pressure when earth embankments are adjacent to any foundation or curb wall and shall be properly coated, cemented, or otherwise protected against water seepage.

¶Proper damp courses shall be provided in all foundation walls and, likewise, proper provision of open drains outside the wall and covered with broken stone or other such expedient to carry off surface water and prevent wet collars.

SEC. 56. In all cases a connection with the street sewer where the same exists shall be established before beginning the work of laying foundations. Before the walls of buildings are carried up above the foundation walls, the cellars shall be connected through drains and catch basins with the street sewer. Should there be no sewer in the street, or if the cellars are below the sewer or ground-water level, then provisions shall be made to prevent water accumulating in the cellars to the injury of the foundations or the occupancy of the basement cellar.

CHAPTER IX

WALLS, PIERS, AND PARTITIONS

SEC. 57. Walls, piers and partitions will be proportioned in thickness, length, and frequency to the loads they have to carry, the class of building, the limits in which that building is erected, and the materials used. And the plans will state specifically the nature and class of building, the floor loads and all such data in order that the Building Department may check up these figures and approve of the thicknesses of such walls, etc., as well as of all else proposed; or, disapproving, may direct how the work shall be done to receive such approval.

SEC. 58. For separate private dwellings or private stables 8-inch brick walls or their equivalent in other materials, may be used for one story, providing no wall is more than 30 feet long, without a break or buttress, and not over 11 feet high and not span more than 18 feet. 8-inch brick walls may be used for small stores, the walls of which are not more than 30 feet long without break or buttress, nor more than 11 feet high nor for spans of more than 18 feet. All 8-inch brick walls must be built with Portland cement mortar.

SEC. 59. Where two stories of frame construction are erected over one story of brick construction, the brick walls shall not be less than 12 inches thick or their equivalent in other materials.

SEC. 60. The walls of all buildings, other than frame or wood, shall be constructed of stone, brick, hollow tile, Portland cement concrete, iron or steel, or, if approved by the Building Department, other hard, incombustible material, and the several component parts of such buildings shall be as herein provided.

SEC. 61. All buildings shall be inclosed on all sides with independent or party walls or piers and incombustible sliding or other doors or shutters, or with metal frames and wired glass or equally fire-resisting inclosures, subject, of course, to the approval of the Building Department.

SEC. 62. The walls and piers of all buildings shall be properly and solidly bonded together with close joints filled with mortar. They shall be built to a line and be carried up plumb and straight.

- SEC. 63. The walls of each story shall be built up the full thickness to the top of the beams above.
- SEC. 64. Walls or piers, or parts of walls and piers, shall not be built in freezing weather, unless the brick and mortar be heated.
- SEC. 65. When walls are more than 25 feet apart, 4 inches shall be added for every succeeding interval of 10 feet or part thereof of increase of distance between them without intermediate division walls or rows of column and girder supports.
- SEC. 66. When any horizontal section of wall shows more than 25 per cent reduction of area on account of flues, openings, and recesses, 4 inches shall be added for every succeeding interval of 10 per cent or part thereof of reduction, provided that, in walls of uniform thickness, such reduction does not exceed 55 per cent of the whole, or, in masonry pier construction, not more than 70 per cent for each bay.
- SEC. 67. When the floors of a building of an established height are to be loaded heavier than the maximum given in the tables of permissible loads, the thickness of walls shall be proportionately increased.
- SEC. 68. All buildings over 100 feet in depth, without a cross-wall or proper piers or buttresses, shall have the side or bearing walls increased 4 inches more than is actually required for load sustaining.
- SEC. 69. All party or division walls of a less thickness than 12 inches shall be corbeled, not less than 3 inches on sides, to receive the floor joists; or instead of corbeling, approved malleable iron or steel joist-hangers may be used.
- SEC. 70. Where it appears that extra or additional stress shall come upon any wall or pier extra provision shall be made for carrying the same by additional thickness of walls, or additional size of pier, or the addition of proper pilasters.
- SEC. 71. The inside 4 inches of any wall may be built of hard-burnt hollow brick, properly tied and bonded by means of full header courses every sixth course into the walls, and of the dimension of the ordinary bricks.
- SEC. 72. Where hollow tiles are used as lining or furring for walls they shall not be included in the measurement of the thickness of such walls. But where terra cotta blocks are so used they shall be allowed their proportionate value in carrying loads.
- SEC. 73. In all walls that are built hollow or in two sections the same quantity of stone, brick, or concrete shall be used in their construction as if

they were built solid, as in this Code provided, and no hollow wall shall be built unless the parts of same are connected by proper ties, either of brick, stone, or iron, placed not over 24 inches apart.

SEC. 74. No recess or chase for water, soil, steam, or other pipes shall be made in any exterior or in any other bearing wall to more than one-third of its effective thickness, and the recesses around said pipe or pipes shall be filled with solid masonry, or plastic incombustible material, after the pipes are in place, for the space of 1 foot at the top and bottom of each story. No recesses shall be made in any exterior or other bearing wall less than 12 inches thick, and no continuous vertical recess other than flues in stacks shall be nearer than 5 feet to any other recess.

SEC. 75. No channeling shall be done in walls which are less than 12 inches thick except for small gas pipes and wire conduits. Recesses for stairways or elevators may be left in the foundation or cellar walls of all buildings, but in no case shall the walls be of less thickness than the walls of the third story, unless reinforced by additional piers with iron or steel girders or iron and steel columns and girders, securely anchored to walls on each side.

¶No horizontal chase shall be more than 4 feet in continuous length, unless the wall be made proportionately thicker.

SEC. 76. All structures exposed to wind shall be designed to resist a horizontal wind pressure of thirty pounds for every square foot of surface thus exposed, from the ground to the top of same including the roof, in any direction. In no case shall the overturning moment due to wind pressure exceed 75 per cent of the moment of stability of the structure. In all structures exposed to wind, if the resisting moments of the ordinary materials of construction, such as masonry, partitions, floors, and connections, are not sufficient to resist the moment of distortion due to wind pressure, taken in any direction on any part of the structure, additional bracing shall be introduced to make up the difference in the moments.

¶In calculations for wind bracing, the working stresses set forth in this Code may be increased by 50 per cent. In buildings under 100 feet in height, provided the height does not exceed four times the average width of the base, the wind pressure may be disregarded.

SEC. 77. It shall be unlawful to erect, construct, or build any rear, front, party, division, or partition masonry wall upon wooden girders, rafters, or lintels, or to support any such wall by any wooden support whatever; but all such supports shall be of iron, brick, or stone and shall rest on sufficient stone or metal bearing blocks, and all metal supports shall be

kept rustless by being well cemented, painted, or otherwise protected from moisture.

SEC. 78. Openings for doors and windows in all buildings shall have good and sufficient arches of stone, brick, terra cotta, or concrete, well built and keyed with good and sufficient abutments; or lintels of stone, iron or steel, terra cotta, or concrete of sufficient strength, which shall have a bearing at each end of not less than 5 inches on the wall.

SEC. 79. All masonry arches shall be capable of sustaining the weight and pressure which they are designed to carry, and the stress at any point shall not exceed the working stress for the material used, as given in this Code.

SEC. 80. Tie rods shall be used where necessary to secure stability.

SEC. 81. Walls heretofore built or used as party walls, whose thickness at the time of their erection was in accordance with the requirements of the then existing laws, but which are not in accordance with the requirements of this Code, may be used, if in good condition, for the ordinary functions of party walls, provided the height of the same be not increased and that the load be not more than they can safely carry. In case additional height or load-carrying is required, then the said party wall or any other wall shall be properly strengthened, reinforced, or braced by additional thickness, columns, or other approved method.

SEC. 82. Any building, the erection of which was commenced in accordance with specifications and plans submitted to and approved by the Building Department prior to the passage of this Code, if properly constructed—with a reasonable factor of safety, though it be not as great a one as is contemplated by this Code—and in safe condition, may be completed, or built upon in accordance with the requirements of the law, as to thickness of walls, in force at the time when such specifications and plans were approved. The Building Department is to be the sole judge as to what may or may not be done in such contingency.

SEC. 83. In no case shall any wall or walls of any building be carried up more than one story in advance of any other wall, except by permission of the Building Department. And this prohibition shall include the inclosure walls for skeleton buildings.

SEC. 84. All exterior piers shall be anchored to the beams or girders on the level of each tier.

SEC. 85. All exterior piers, except of fireproof buildings, on the lot line, and division and party walls over 15 feet high, shall have parapet or coping

walls, carried at least 18 inches above the roof, and shall be coped with incombustible material. The front and rear walls, if facing on the street, alley, or open space, may have the parapet wall omitted. Open balustrades shall not be placed above the cornice line of any building unless they are built of incombustible material, nor shall the top rail of such balustrades be over 5 feet above the roof line. Parapet walls and party or division walls shall extend at least 2 feet above flat roofs.

SEC. 86. In all walls furred with wood the brick work between the ends of the wood beams shall project the thickness of the furring beyond the inner face of the wall for the full depth of the beams.

SEC. 87. The height of stories for all given thicknesses of walls except by special permit, shall not exceed the following:

First story.....	16 feet in the clear
Second story.....	14 feet in the clear
Third story.....	12 feet in the clear
Fourth and upper stories.....	11 feet in the clear

¶And if any story exceeds the foregoing heights, the walls of any such story and all walls below that story shall be increased proportionately.

SEC. 88. Stone, cement block, or terra cotta facing shall be not less than 4 inches in thickness at any place, and shall be securely anchored to the brick backing at least every 2 feet vertically and horizontally. The facing walls shall not be counted as a part of the thickness of brick walls, unless the average thickness of facing is thoroughly bonded into the walls, in which case one-half the average thickness of facing shall be allowed in calculating thickness of wall.

SEC. 89. 8-inch curtain walls of brick, hollow tile, or concrete will be allowed in all steel framed buildings (except in party walls) between piers or steel columns 16 feet on centers and not over 12 feet high. Party walls in such buildings must not be less than 12 inches thick at any story.

SEC. 90. In all apartment houses, the dividing walls or partitions between the apartments provided for each family, where not separated by a hall or stairway, shall be made of incombustible material. In the absence of definite subdivisions between the apartments of different families, eight rooms shall be counted as the equivalent of one apartment. In all buildings, not of fireproof construction, there shall be, for every eight rooms in any one story, dividing walls—or partitions of incombustible material separating the rooms from the contiguous spaces—solid walls, or walls with openings, if the latter be provided with self-closing fire doors.

SEC. 91. In double houses or houses in block for the dividing walls shall be of brick or other incombustible material, extending from the cellar to 1 foot above the roof, and 2 feet above flat roofs, excepting in case of steep roofs of double houses, where division walls shall be carried to under side of roof boards.

SEC. 92. When brick walls surround stairways, elevator shafts, shaving pits, and light shafts, they shall not be less than 8 inches thick, but no such, or any other, 8-inch wall shall be built more than 20 feet high without lateral support or anchorage.

SEC. 93. In calculating the strength of isolated piers or divisions forming portions of walls, the least dimensions shall be considered in determining the loads which such piers may carry. If outside walls are of pier construction, the piers shall be graded in size according to weights to be carried, but not less than 16 inches thick for the upper story.

¶Such piers shall have a width of 24 inches for an 8-foot bay, measuring from center to center of pier, and shall increase as the width of the bay is increased. Curtains or panels between piers shall be at least 8 inches thick, and of brick or the equivalent thereof.

SEC. 94. No isolated brick or other pier whose height exceeds ten times its least dimensions shall be built, and any such pier where receiving concentrated loads shall have suitable bearing blocks of stone, or iron, or other such solid, so proportioned as properly to distribute the load to come upon it.

SEC. 95. In case piers are faced with pressed brick or other facing, they shall be so laid as to have proper bearings of mortar under each course, so that the strength of the pier may be fully maintained on all sides; the central part of the pier shall be laid in Portland cement.

¶In blocks of frame houses the dividing partitions, between three houses, may be built with 5-inch studs, filled in solid with 4 inches of brickwork laid in mortar, or with other incombustible material, carried to the under side of the roof boards. Such dividing partition shall rest on a brick, concrete, or stone wall in the cellar. Where it is impractical to build a partition with masonry filling, and at the discretion of the Building Department, a 4-inch stud partition filled in solid with mineral wool, held in position by blocks every 3 feet in height, and plastered on both sides with hard plaster on metal lathing, may be used for a fire-retarding dividing partition. In blocks of more than three houses there shall be a solid brick, or other fire wall extending above the roofs, as described for fire walls, at every third house.

¶Openings in the fire or party walls of buildings shall in no case exceed 8 feet in width, or 10 feet in height, and above each such opening there shall be a curtain wall, between the top of the opening and the ceiling line, of at least 3 feet. The opening shall be provided with approved automatic self-closing, standard fireproof doors on both sides of the wall and such openings may only be made in completed buildings with the permission of the Building Department.

SEC. 96. Public stair-halls in apartment blocks or tenement buildings shall be inclosed by brick walls or walls of incombustible materials of equal fire-resisting capacity, and openings to separate apartments or tenements shall be by approved fire doors and no transoms shall be allowed. Such fireproof stairs shall lead directly to the street and be inclosed at the street level with similar fire walls with fire doors to the apartments, or stores on the first floor, the object being to have an absolutely clear, direct, and fireproof exit from the top story to the street.

¶In every building hereafter erected or altered, all walls or partitions forming interior light or vent shafts, shall be constructed of brick or of other incombustible materials, except that where approved by the Building Department, in inferior buildings in the outer limits, they may be constructed of 4-inch studs, filled in solid with fireproofing material or plastered on both sides on metal lathing and always with masonry fire stops at each floor, and shall extend 2 feet above the roof.

SEC. 97. The windows in said shafts shall have metal frames and sash, and wire glass. Ceiling lights under shafts shall have wire glass in metal frames. Where shafts start above the first floor, they shall be supported by steel or concrete beams.

SEC. 98. Walls of dumb-waiters, clothes chutes, or other similar shafts must be built of or lined with incombustible material as directed for light and vent shafts and shall be provided with an approved metal-clad door at each opening.

SEC. 99. All receptacles for ashes, garbage, waste paper, etc., shall be of galvanized iron, brick or other incombustible material. When the ash or other such pit is located in a basement or cellar, it shall have brick walls at least 8 inches in thickness, and, if the floor over the same is of wood, such pit shall be covered over with either brick, tile-arching, stone, or concrete, not less than 4 inches thick with 4 inches of air space between the covering of pit and the ceiling, except for pits built directly under the trimmer arches of hearths.

¶No person shall store ashes on a wooden floor or in close proximity to any woodwork whatever.

SEC. 100. Bake ovens shall rest on solid foundations or steel beams; the sides and ends shall be at least 2 feet from any woodwork and the crown or arch at least 4 feet from ceilings that have wood joists. The hearth in front of all bake ovens shall extend at least $3\frac{1}{2}$ feet beyond the face thereof and all woodwork over ovens shall be protected by plastering or by metal.

SEC. 101. Shaving pits in all factories where woodworking machinery is used shall be constructed of brick, stone, or other incombustible material and shall be separated from the boiler room by standard fire doors with bottom sill at least 12 inches above the floor of the boiler room. All such factories shall have metal chutes leading to said shaving pits from each wood-working machine.

SEC. 102. Dry kilns shall be constructed of brick or of other incombustible materials.

SEC. 103. All smoke houses shall be of fireproof construction, with brick walls, iron doors, and brick or metal roof.

¶An iron guard shall be placed over and not less than 3 feet above the grate, and the hanging rails shall be of iron and an iron grating shall be placed under the first row of hanging rails, and be not less than 8 feet above the floor of the fire-pit.

¶The walls of all smoke houses shall be built at least 3 feet higher than the roof of the building in which they are located, and shall be not less than 12 inches in thickness and be coped with stone or its equivalent.

SEC. 104. All walls, ceilings, and partitions inclosing drying rooms, when not made of fireproof material, shall be wire-lathed and plastered, or covered with metal, tile, or other hard incombustible material.

CHAPTER X

BOILERS, OVENS, AND HEATING APPARATUS

SEC. 105. All boilers, furnaces, fireplaces, ovens, and all other heating apparatus mentioned in this chapter shall be properly connected with a flue, chimney, or stack as direct and within the shortest distance possible.

SEC. 106. Approved temporary heaters for use during the erection of buildings shall be placed upon a layer of brick or a bed of sand 4 inches thick with legs resting on brick, and shall not be set within 5 feet of any wood-work and shall be protected with a sheet-iron pan underneath, projecting at least 6 inches beyond the sides of the heater.

SEC. 107. No brick-set boiler for the generation of hot water, or steam for heating or power, or any portable power boiler or engine over 10 horsepower, shall be placed on any wood or combustible beam or floor.

SEC. 108. Wood or combustible floor and beams under and not less than 3 feet in front and 1 foot on the sides of all portable boilers shall be protected by a suitable brick foundation of not less than two courses of brick well laid in mortar on sheet iron or asbestos board; the said sheet iron or asbestos shall extend at least 24 inches outside of the foundation at the sides and front. Bearing lines of brick, laid on flat with air spaces between them, shall be placed on the foundation to support a cast-iron ash pan of suitable thickness on which the base of the boiler shall be placed, and shall have a flange, turned up in the front and on the sides, 4 inches high. Said pan shall be in width not less than the base of the boiler, and shall extend at least 2 feet in front of it.

¶If a boiler is supported on a cast-iron base, with the bottom of required thickness for an ash pan, and is placed on bearing lines of brick in the same manner as specified for an ash pan, the ash pan shall be placed in front of the said base and shall not be required to extend under it.

¶All wood ceilings and beams over and up to a distance of not less than 4 feet of all boilers shall be shielded with plaster on metal-suspended ceiling or other equally good protection. The distance from the top of the boiler to said shield shall be not less than 12 inches.

¶Brick or other fireproof walls shall surround the boiler room.

SEC. 109. Boiler and fuel rooms and smoke houses, which may hereafter be constructed, shall be located not less than 8 feet distant from any other building and shall be built throughout of incombustible material. All openings to such boiler and fuel rooms and smoke houses, if same are located within 30 feet of any other building, shall have shutters and doors of metal or wood covered with metal on both sides and edges.

¶No boiler for the generation of more than 10 horse-power shall be placed in any frame building. If existing boiler rooms are within dangerous distance (30 feet for 250 H. P., and 20 feet for 75 H. P., and 8 feet for 10 H. P.) of other buildings, then those boiler or fuel or smoke rooms, must at once be made fireproof.

¶Boiler and fuel rooms when constructed in buildings, shall be separately inclosed in brick walls so arranged that all openings between them and other parts of the building will be securely closed with automatically closing fire doors and it will be a punishable offense to ever block or fasten any such or other automatically or self-closing fire door open.

SEC. 110. If any question should arise relating to boiler rooms, fuel rooms, and rooms containing gas or gasoline engines, for which there is no provision in this Code, the Building Department shall have, as in all other cases of doubt, lack of specific requirements or conflicting requirements, full power to act, and its decision in the matter shall be of the same effect as if that special requirement were contained in this Code, and the same will be made thereto as an amendment.

SEC. 111. All brick-set, hot-air furnaces shall have two covers, with an air space of at least 4 inches between them; the inner cover of the hot-air chamber shall be either a brick arch or two courses of brick laid on galvanized iron or tin, supported on iron bars; the outside cover, which is the top of the furnace, shall be made of brick or metal supported on iron bars and so constructed as to be perfectly tight, and shall be not less than 12 inches below any combustible ceiling or floor beams, that, in turn, must be protected with plaster on wire lath or sheet asbestos and for a space at least 3 feet larger than the furnace.

¶The walls of the furnace shall be built hollow in the following manner: one inner and one outer wall, each 4 inches in thickness, properly bonded together with an air space of not less than 2 inches between them.

SEC. 112. All portable hot-air furnaces shall have a double cased jacket of not less than No. 26 iron from the base to the top of casting, with an air space of at least 1 inch between, and shall be placed at least 2 feet from any wood or combustible partition or ceiling and these protected by a metal or asbestos or equivalent shield.

¶Wood floors under all portable furnaces shall be protected by two courses of brick work well laid in mortar on sheet iron. Said brick work shall extend at least 2 feet beyond the furnace in front of the ash pan and lower course bricks shall be spaced so as to allow ventilation.

SEC. 113. The cold-air boxes of all hot-air furnaces shall be made of metal, brick, or other incombustible material, for a distance at least 10 feet from the furnace, and shall be so constructed as to be kept free from dust, and that they may be cleaned out, and shall be kept clean.

SEC. 114. In cases where hot water, steam, hot air, or other heating appliances or furnaces are hereafter placed in any building, or flues or fireplaces are changed or enlarged, due notice shall first be given to the Building Department by the person or persons placing the said furnace or furnaces in said building, or by the contractor or superintendent of said work, that proper inspection be made and permit issued.

SEC. 115. Where a kitchen range is placed within 6 inches of a wood wainscot or wood partition, the said woodwork shall be shielded with metal, asbestos, or equivalent protection from the floor to the height of not less than 2 feet higher than the range.

¶All ranges on wood or combustible floors and beams, that are not supported on legs and have ash pans 3 inches or more above their base, shall be set on zinc, brick, or cement foundations.

¶No range shall be placed against a furred wall.

¶All wood ceilings over all large ranges such as in hotels and restaurants etc., shall be guarded by metal hoods placed at least 9 inches below the ceiling.

¶A ventilating pipe connected with a hood over a range shall be at least 9 inches from all lath and plaster or woodwork and shielded. If the pipe is less than 9 inches from lath and plaster and woodwork, then the pipe shall be covered with $\frac{1}{2}$ inch of asbestos plaster or other incombustible covering. No ventilating pipe connected with a hood over a range shall pass through any floor unless protected.

SEC. 116. Laundry stoves on wood or combustible floors shall have zinc or a course of brick, laid on metal, on the floor under and extended 24 inches on all sides of them. All stoves for cooking and heating purposes shall be properly supported on iron legs resting on the floor 1 foot from all lath and plaster or 2 feet from woodwork; if the lath and plaster or woodwork are properly protected by a metal or asbestos shield, then the distance shall be not less than 1 foot. A metal shield shall be placed under and 12 inches in front of the ash pan of all stoves that are placed on wood floors.

SEC. 117. All low gas stoves shall be placed on iron stands, or the burners shall be at least 6 inches above the base of the stove, and metal guard plates placed 4 inches below the burners and all woodwork under them shall be covered with metal. Open gas stoves shall be isolated in the same manner as provided for stoves; if properly air insulated within themselves, they shall be placed 2 feet distant from all unprotected woodwork, or 1 foot from plastered stud partitions.

¶The use of gas burners or heaters, located in a floor system under an open register, or on the outside of the firepot of any hot-air furnace, in which the products of combustion are allowed to escape into a room is hereby prohibited, and all such burners or heaters so located shall be removed within forty days after the passage of this Code. All gas ranges and gas stoves shall have vent pipes of suitable size, connected with flue.

SEC. 118. No gas log, gas grate, or other gas fireplace heater shall be installed in any building except in a brick fireplace connected with a chimney flue. No gas light or other burner shall be nearer than 2 feet to any wood or plaster on wood ceiling unless the burner is shielded with suitable mica or other deflector, and in no case will a wall bracket for gas or oil or other flame light be permitted less than 2 feet away from the window or external door, and all such brackets, anywhere, must have the gas flame at least 12 inches distant from wall.

SEC. 119. All core and annealing ovens, or any portable smelting furnaces, shall be set on incombustible hearths with an air space of at least 5 inches between hearths and the bottom of such ovens or furnaces. The construction of hearths and protection of surrounding woodwork shall be the same as prescribed for portable boilers or hot-air furnaces.

CHAPTER XI

STOVE AND SMOKE PIPES

SEC. 120. All stone or brick hot-air flues and shafts shall be lined with tin, galvanized iron, or burnt clay pipes, or cemented with a heat-proof, non-cracking cement.

SEC. 121. No wood casing, furring, or lath shall be placed against or cover any smoke flue or metal pipe used to convey hot air or steam.

SEC. 122. No stove pipe shall be placed nearer than 9 inches to any lath and plaster or board partition, ceiling, or any woodwork.

¶Smoke pipes of large laundry stoves, of large cooking stoves, and of furnaces shall not be less than 15 inches from any woodwork, unless they are properly guarded by metal shields; if so guarded, such pipes shall not be less than 9 inches distant.

SEC. 123. No smoke pipe shall pass through the wooden roof of any building unless a special permit be first obtained from the Building Department for the same. If a permit is so granted, then the roof through which the smoke pipe passes shall be protected by means of galvanized iron ventilated thimble of the following dimensions: In case of a stove pipe, the diameter of the outside guard shall be not less than 12 inches and the diameter of the inner guard 8 inches larger than the smoke pipe; and for all furnaces or where similar large hot fires are used, the diameter of the outside guard shall be not less than 18 inches and the diameter of the inner one, 12 inches larger in diameter than pipe. The smoke pipe thimbles shall extend from the under side of the ceiling or roof beams to at least 9 inches above the roof, and they shall have openings for ventilation at the top of the guards above the roof.

¶Where a smoke pipe of a boiler passes through a wooden roof, the same shall be guarded by a ventilated thimble, as before specified, 36 inches larger than the diameter of the smoke pipe of the boiler.

SEC. 124. Where smoke pipes pass through a wood or plastered partition, or furred wall, or floor, they shall be surrounded either by a body of hard, incombustible material, measuring at least 4 inches all around such smoke

pipe, or they shall be surrounded by a double safety thimble of sheet metal at least 1 inch apart, and the entire thimble so constructed that there will be a circulation of air between the two rings forming the same.

¶No smoke pipe shall project through an external wall unless connected with a chimney or metal stack carried above the roof.

SEC. 125. No stove or smoke pipe or any pipe conducting the products of combustion from any range, oven, or heater shall be concealed in any wood partition or be placed nearer than 9 inches to an unprotected lath and plaster or board partition, ceiling, or any woodwork.

SEC. 126. Smoke pipes of greater diameter than 12 inches and less area than 6 square feet, must be at least 20 inches from any woodwork, unless the same is properly protected by a shield, in which case the distance shall not be less than 12 inches.

¶Smoke pipes of larger area than 6 square feet shall be kept at least 3 feet distant from any woodwork, unless the same is properly protected by a shield, in which case the distance shall not be less than 18 inches.

SEC. 127. The metal shields prescribed in the previous section shall be at least twice the diameter of the pipe in width and shall have a ventilated air space of at least 1 inch between shield and woodwork.

SEC. 128. Where pipes are used for the distribution of hot air from hot-air furnaces in buildings, such pipes must be made of metal, and double; the space between the two metal pipes shall be at least $\frac{3}{8}$ inch; such pipes shall be made with air-tight joints and be securely fastened to the partitions through which they pass; or, in lieu thereof, the pipes may be covered with asbestos paper, weighing not less than 14 pounds per 100 square feet; thoroughly pasted to pipes and also wired every 2 feet with wire or bands; and the studs and the other woodwork within 1 inch of the pipe shall be lined with bright tin, and the pipes shall be covered with metal lathing.

SEC. 129. The openings in floors for hot-air registers shall be surrounded with borders of incombustible material, not less than 2 inches wide, and securely set in place. The register boxes shall be double, the distance between the two thicknesses of tin being at least 1 inch, or they can be single if covered with asbestos paper, and the woodwork lined with tin in a manner similar to that specified in the preceding paragraph for the pipes. Such floor registers cannot connect directly down a pipe to the furnace; there must be an offset to catch dust and dirt and the register must be removable and the chamber kept clean.

CHAPTER XII

CHIMNEYS, FLUES, AND FIREPLACES

SEC. 130. The foundations of chimneys, flues, and stacks, whether inside or outside of buildings, or whether connected with the same or isolated, shall be designed and built in conformity with the provisions relating to foundations of buildings.

¶When the breast of a chimney or fireplace projects more than 4 inches it shall be started and built on the same line from the foundation.

SEC. 131. All chimneys shall be built of brick, stone, or other fireproof material. The exterior walls of chimneys shall be at least 4 inches thick and constructed with a suitable flue lining of terra cotta, or 8 inch walls without lining may be used.

SEC. 132. No chimney shall be corbeled from a wall more than 4 inches or be hung from a wall less than 12 inches thick unless it projects equally on each side of the wall; nor shall a chimney rest upon any wooden floor or beam.

SEC. 133. The walls of all chimneys shall rest upon footings at or below the level of the ground, or upon a continuous support of masonry or metal extending to footing as above stated; provided, however, that upon written permission of the Building Department chimneys may be built upon a footing or flooring of masonry or concrete supported by iron beams which have secure bearings on masonry, iron, or steel at both ends.

¶Where chimneys are supported by piers, the piers shall start from the foundation.

¶When a chimney is to be cut off below, in whole or in part, it shall be wholly supported by stone, brick, iron, or steel.

SEC. 134. All existing chimneys that the Department deems dangerous in any manner whatever, shall be repaired and made safe or taken down.

SEC. 135. No smoke flue shall be less than 8 inches by 8 inches.

¶All smoke flues shall be proportioned to the volume of gases to pass through the same.

- SEC. 136. Not more than two stoves or two furnaces shall be connected with an 8-inch by 8-inch flue, nor more than four stoves or three furnaces with an 8-inch by 12-inch flue, and one flue only may serve more than one story if properly offset to prevent back-drafts.
- SEC. 137. Where smoke pipes enter flues, the brickwork must be corbeled out to the face of the studs; the part thus corbeled out shall not be less than 16 inches by 16 inches, but in no case shall such corbeling exceed the thickness of the wall.
- SEC. 138. Terra-cotta crocks shall be inserted for receiving all smoke pipes.
- SEC. 139. Tops of chimneys shall extend at least 3 feet above flat roofs, and as high as the main ridge of pitched roofs, except that chimneys at or near the ridge shall extend at least 2 feet above the ridge.
- SEC. 140. All fireplaces and chimneys in stone or brick walls in any building hereafter erected, except as herein otherwise provided, and any chimney or flue hereafter altered or repaired without reference to the purpose for which they may be used, shall have the joints struck smooth on the inside, except when lined on the inside with a well-burnt clay or terra cotta pipe.
- SEC. 141. All fireplaces shall be at least 24 inches wide, and the hearth shall extend at least 12 inches beyond the opening on each side, and at least 18 inches in front.
- SEC. 142. The firebacks of all fireplaces hereafter erected shall not be less than 8 inches in thickness of solid brickwork, nor less than 12 inches if of stone.
- SEC. 143. When a grate is set in a fireplace a lining of firebrick, at least 2 inches in thickness, shall be added to the fireback, unless soap stone, tile, or cast iron is used.
- SEC. 144. The walls of all high-pressure boiler flues shall not be less than 12 inches thick and the inside 4 inches of such walls shall be firebrick laid in fire mortar, for a distance of 25 feet from the source of heat.
- SEC. 145. All smoke flues of smelting furnaces or of steam boilers, or other apparatus which heat the flues to a very high temperature, shall be built with double walls of suitable thickness and with an air space between the walls; the inside 4 inches of the flues shall be of firebrick laid in fire mortar, for a distance of not less than 25 feet from the source of heat.
- SEC. 146. For any now-existing brick building where it becomes necessary to provide a smoke flue of larger size than any flue within the building, such flue may be placed on the outside of the building, and be made round

in shape and of sheet metal not less than $\frac{1}{8}$ of an inch in thickness, properly riveted together at all joints and carried up to a height not less than 10 feet above the roof, and be properly braced at intervals for its entire length with flat iron bands secured with expansion bolts to the wall, leaving a free air space of not less than 4 inches between the outside of the metal flue and the brick wall of the building, and have a clean-out door at the bottom. This metal flue shall rest on a suitable cast iron base at the bottom, supported on a suitable foundation of masonry.

SEC. 147. Iron cupola chimneys of foundries shall extend at least 10 feet above the highest point of any roof within a radius of 50 feet of such cupola, and be covered on top with a heavy wire netting and capped with a suitable spark arrester.

¶No woodwork shall be placed within 2 feet of the cupola.

SEC. 148. All fireplaces and chimney breasts, whether intended for ordinary fireplace uses or not, shall have trimmer arches to support hearths, and no woodwork shall be used under such arches.

¶The said arches shall be at least 18 inches in width, measured from the face of the chimney breast, and they shall be constructed of brick, stone, burnt clay, or concrete.

¶The length of a trimmer arch shall not be less than the width of the chimney breast.

¶Wood centers under trimmer arches shall be removed before plastering the ceiling underneath.

SEC. 149. If a heater is placed in a fireplace, then the hearth shall be 6 inches wider than the full width of the heater.

¶All fireplaces in which heaters are placed shall have incombustible mantels.

SEC. 150. No wood mantel or other woodwork shall be exposed back of a summer piece; the iron work of the summer piece shall be placed against the brick or stonework of the fireplace.

SEC. 151. No fireplace shall be closed with a wood fireboard.

CHAPTER XIII

FRAME BUILDINGS AND BRICK-AND-FRAME BUILDINGS

SEC. 152. A frame building shall be taken to mean a building or structure of which the exterior walls shall be constructed of wood. Buildings sheathed with board and partially or entirely veneered on the outside with 4 inches of brickwork or other masonry shall be deemed frame buildings. Wood frames covered with metal shall be deemed frame buildings.

SEC. 153. Separate frame buildings other than tenement houses shall be located or built not less than 2 feet from the line of the lot upon which the same is located, when such building is one story in height, and at least 3 feet from said lot line for buildings two stories in height, and at least 4 feet from said lot line for buildings three stories in height.

SEC. 154. No frame building shall be hereafter erected or altered over three stories in height or to be occupied by more than six families. But nothing herein shall be taken to prevent the construction of blocks of frame buildings separated by fire walls as specified in this Code.

SEC. 155. In all frame dwellings hereafter erected, that are three stories in height, the outside or inclosing studs shall be not less than 2 inches by 6 inches, or its equivalent in strength; and where the height of outside walls is not more than 27 feet, 4 inches wide studding may be used, provided a 4-inch by 6-inch girt is introduced at the level of the first story ceiling.

SEC. 156. In all frame buildings that exceed 24 feet in depth, there shall be a middle post on each side 4 inches by 6 inches in one continuous length, and if buildings exceed 20 feet in width, there shall also be a post the same as above.

SEC. 157. All beams, girders, columns, trusses, and other structural members shall be proportioned of sufficient strength to sustain the load to be supported. In all cases suitable provisions shall be made to take up and properly distribute the stresses due to concentrated or eccentric loading, and also to prevent danger from horizontal or vertical deflection or the buckling or shear of members.

SEC. 158. The spaces between the studs on the top of first floor joists of outside and inside walls of all frame buildings shall be closed with 2-inch fire stops shutting off all spaces. On all the other floors of frame buildings constructed with a board girt, the spaces on the under side and also on top of joists, shall be filled with a fire stop not less than 2 inches thick, securely fastened and properly fitted to fill voids between outside studding.

SEC. 159. All wood beams and other timbers in any wall of a building built of stone, brick, concrete, or iron, shall be separated from the beam or timber entering in the opposite side of the wall by at least 4 inches of solid mason work; such separation may be obtained by corbeling or by staggering the beams.

SEC. 160. No beams or other timbers shall be cut for pipes or tubes in any manner which shall impair the strength of the timbers; and in no case shall they be cut further from the bearings than twice the depth of the timber. When studs are cut more than one-third their depth, they shall be reinforced. All cutting shall be done by or under the direction of the carpenter. Joists shall be bored near the middle for pipes, when it is impossible to place them as above provided.

SEC. 161. Drawings of all trusses and special or unusual framing showing sizes of members, shall be submitted with plans and specifications to the Building Department and, when required by the Building Department, a strain sheet showing stresses in truss members shall be submitted.

SEC. 162. All interior studding shall be but one story in height, set on caps or soles, except where partitions are over girders; the studding shall be seated on the girders and have caps not less than 3 inches thick with 2-inch fire stops at each story. Exterior studding shall be two stories high, or alternating, breaking joint at second story.

SEC. 163. All wood trimmer and header beams shall be proportioned to carry with safety the loads they are intended to sustain.

SEC. 164. The ends of all tail beams shall be properly framed, or hung to, or thoroughly spiked into, the header beams. In calculation of stresses, the factors of safety shall be used as given under the head "Factors of Safety" in this Code.

¶The ends of all beams buried in masonry walls shall be beveled back not less than 3 inches.

SEC. 165. In all 8-inch division walls, joists shall not rest in the wall, but shall be supported upon approved joist hangers, unless the wall is corbeled so as to keep the ends of joists 4 inches apart.

¶ Walls shall be anchored to the ends of joists every 5 or 6 feet by wrought-iron anchors not less than $\frac{1}{4}$ inch by $1\frac{1}{2}$ inches, and not less than 16 inches long.

¶ Walls running parallel to joists shall be anchored by similar anchors extending over two joists.

SEC. 166. Wall plates shall be anchored to walls every 5 or 6 feet.

SEC. 167. No timber or other woodwork shall be placed within 1 inch of the outside of the wall of any chimney or flue.

SEC. 168. The ends of girders buried in walls shall have an air space around them.

SEC. 169. All wood floor and wood roof beams shall be properly bridged with cross bridging, and the distance between bridging or between bridging and walls shall not exceed 8 feet. Once in the length of all joists there shall be placed boards the full depth of the joist to act as cut-offs—fire barriers to stop the flue-like drafts between joists in frame buildings.

SEC. 170. Wood posts will not be allowed in cellars of any buildings.

SEC. 171. Frame buildings shall not be calculated or constructed to carry less than the minimum floor and roof loads specified in this Code. And no frame building shall be carried higher than three stories or 40 feet above the lowest point of street grade.

SEC. 172. Sills in frame buildings shall not be less than 4 inches by 6 inches.

SEC. 173. Girders shall not be less than 6 inches by 8 inches and shall be of sufficient strength to carry the superimposed load.

SEC. 174. The use of wood cornices is prohibited in the fire districts. All bay windows and projecting cornices over store windows within the outer fire limits, shall be constructed of or covered with metal or other incombustible material. If bay windows are constructed with studs, they shall be filled in solid with brickwork or hollow tile.

SEC. 175. Temporary one-story frame buildings may be erected for the use of builders, within the limits of lots whereon buildings are in course of erection, or on adjoining vacant lots, upon permits issued by the Building Department, and for a specific time.

¶ Temporary structures shall also include platforms, stands, election booths, tents, and all such shelters. Permits therefor shall be limited to three months, excepting that contractors' offices above described may remain until such office space can be arranged within the permanent building.

- SEC. 176. Sheds of wood within the outer fire limits not over 15 feet high nor over 20 feet square, open on at least one side, with the sides and roof thereof covered with fireproof material, may also be built, but a fence shall not be used at the back or side thereof.
- SEC. 177. Fences of wood shall not be allowed inside the inner fire limits, and outside of them shall not be erected over 10 feet high above the surface of the ground, and shall be properly supported and braced.
- SEC. 178. Signs of wood over 2 feet high shall not be erected on any building, and no sign of wood shall be placed above the front wall or cornice or roof of any building.
- SEC. 179. Sky signs or any device in the nature of an advertisement, announcement, or direction, constructed of sheet metal or wire fastened to wood frames supported upon or above or attached to any building, will be permitted, but if such sky signs shall exceed 2 feet in height they shall be constructed entirely of metal, including the uprights, supports, and braces for same, and shall not be more than 20 feet in height above the front wall or cornice or roof of the building or structure to which they are attached or by which they are supported.
- SEC. 180. Before any wood or metal sign shall be placed in position upon, above, or attached to, the outside of any building, or any fence built, or bill or advertising boards put up, a permit shall first be obtained from the Building Department. Such signs shall be so constructed, placed, and supported as not to be or become dangerous.

MILL CONSTRUCTION

- SEC. 181. That form of construction in which heavy posts and girders, with wide spacing, support floors and roof of heavy planking, constitutes the structural framing contained within outer walls and roof covering of incombustible material.
- SEC. 182. In mill construction, no timber shall be less than 6 inches in either of its cross-dimensions. Floor and roof planking of more than 5 feet spans shall not be less than 2 $\frac{3}{4}$ inches in thickness.
- SEC. 183. Wood posts shall have cast-iron caps and bases with pintle connections, or steel or iron box caps with projections for receiving the ends of girders made so that the girders shall be self-releasing.
- SEC. 184. Mill construction shall be in strict accord with the requirements of the National Board of Underwriters. All the timbers shall be self-releasing from the posts and walls. There shall be fireproof stairs in fire-

proof walls at or outside the outer walls. The openings in floors shall be fire guarded. The floors shall be drained and scuppered to the outside. The roof covering shall be fire-resisting and mill constructed buildings shall not be permitted in the inner fire limits.

¶Mill construction, within brick or stone or concrete walls, shall be permitted to four stories or 55 feet above the lowest point of street grade.

¶So-called "Semi-Fireproof" construction of wood joists and steel beams in brick or concrete or stone walls, *i. e.*, any system in which wood enters as a structural element in any way whatsoever, may also be carried up to four stories or 55 feet above the lowest point of street grade.

CHAPTER XIV

FIREPROOF CONSTRUCTION

SEC. 185. Fireproof construction shall be required in:

(a) Every building hereafter erected or altered to be used for any purpose, over four stories in height, or four stories and basement, or over 55 feet in height.

(b) All public buildings and all other buildings hereafter erected or altered to be used as hotels, or lodging-houses, or apartments, or for any other purpose not herein especially enumerated, or buildings in which many people congregate or are employed, and which are over three stories in height, or three stories and basement, or 45 feet in height, or buildings containing an assembly hall, all schools, hospitals, asylums, department stores, shops, or factories over two stories and a basement. Except in all cases under heading "b" where the first floor is made of fireproof construction, one extra story in height is allowed. Provided, however, that all the hallways, stairways, and corridors in each and every building described in this heading "b" shall be made of fireproof construction.

(c) All theaters hereafter constructed, or buildings altered to be used for such, having a seating capacity of 600 or more.

(d) All buildings used for the storage of petroleum or other articles of a like nature which shall be subject to the approval of the Fire Marshal.

SEC. 186. A building shall be considered fireproof when constructed with walls of well burned brick or hollow tile; granite or stone; Portland cement concrete, solid or in blocks; iron or steel, in which wood beams or lintels shall not be placed and in which the floors and roofs shall be constructed with rolled steel or reinforced-concrete floor beams and girders, and in which all steel or damageable material is protected by a fire-resistant covering.

¶The spaces between the beams and girders shall be filled with arches or slabs of fire-resisting materials or continuous reinforced concrete or terra cotta slabs without beams, or girders may be used. But any novel or other system of construction with which the Department is not familiar may first be subjected to such tests as are provided in Section 198 before being approved by it and the construction permitted to proceed.

SEC. 187. Between the floor and roof beams shall be placed brick arches springing from the lower flanges of the steel beams, or the spaces between the beams may be filled with hollow tile arches segmental or flat, of hard burnt clay or porous terra cotta, or arches of Portland cement concrete, reinforced with metal, or other fireproof composition may be used, provided that in each and all cases the strength and method of construction shall conform to the requirements of the Building Department and the building generally shall conform to the specifications of Sections 188 to 193 inclusive.

SEC. 188. The stairs and staircase landings shall be constructed of brick, hollow tile, stone, marble, glass, slate, Portland cement concrete, iron or steel, or a combination of these materials.

SEC. 189. No woodwork or other inflammable materials shall be used in any of the partitions, furrings, or ceilings in any such fireproof buildings, excepting, however, that when the height of the building does not exceed six stories nor more than 80 feet, the doors and windows and their frames and trims, the casings, the interior finish when filled solidly at the back with fireproof material, and the spaces under the floor boards and between the sleepers shall be solidly filled with concrete or incombustible materials extending up to the under side of the floor boards.

SEC. 190. When the height of a fireproof building exceeds six stories, or more than 80 feet, the floor surfaces shall be of stone, cement, hollow tiling, or similar incombustible material. All outside window frames and sash shall be of metal and where the building may be endangered by adjacent structures or from across narrow streets (less than 30 feet) and alleys there shall be wired glass in the metal sash or other equivalent window protection.

¶The inside window frames and sash, doors, trim, and other interior finish may be of metal or of wood covered with metal, or of such other incombustible material that may be approved by the Building Department, and these sash glazed with wire glass, or have other suitable protection to act as fire cut-offs, dividing the floor area into units of reasonable size and never in excess of what is provided in Section 397.

SEC. 191. All hall partitions or permanent partitions between rooms in fireproof buildings shall be built of fireproof material and shall not be started on wood sills nor on wood floor boards, but be built upon the fireproof construction of the floor and extend to the fireproof arches above.

¶The tops of all door and window openings in such partitions shall be at least 12 inches below the ceiling line.

SEC. 192. In all fireproof partitions, other than when made of solid brickwork, the openings for doors and windows in the same shall be framed on both sides with iron studs or uprights secured at top and bottom to the floor construction, and with like iron horizontals between the said uprights for the window and door heads, or such other incombustible construction as may be approved by the Building Department.

SEC. 193. In all fireproof buildings, other than stores, warehouses, and factories, if exceeding three stories or 45 feet in height, the stair halls and the elevators shall be enclosed on each story with fireproof material, forming an enclosure, the floor area of which shall not be less than 3 times the united area of the floor openings for the elevators and the stairs. Or the stair and the elevator shafts may be enclosed in wire glass in metal frames, or other such equivalent protection, and right on the line of the floor opening if desired. But in every case at each story there shall be fireproof, solid or transparent, self-closing doors to each such stair and elevator, or stair or elevator hall.

SEC. 194. Fireproof floors between the steel floor beams may be in the form of brick arches springing from the lower flanges of the steel beams.

¶Said brick arches shall be designed with a rise to safely carry the imposed load, but never less than $1\frac{1}{4}$ inches for each foot of span between the beams, and they shall have a thickness of not less than 4 inches for spans of 6 feet or less, and 8 inches for spans over 6 feet or such additional thickness as may be required by the Building Department.

¶Said brick arches shall be composed of good hard brick or hollow brick of ordinary dimensions laid to a line on the centers, properly and solidly bonded, each longitudinal line of brick breaking joints with the adjoin-

ing lines in the same ring and with the ring under it when more than a 4-inch arch is used. The said arches shall spring from protecting skewbacks of burnt clay resting on and covering the lower flanges of the beams, so as to afford a minimum protection of 2 inches of solid burnt-clay material underneath the flanges, or otherwise entirely incasing the said flanges as provided for in this section. The brick shall be well wet and the joints filled in solid with strong Portland cement mortar. The arches shall be grouted and properly keyed.

SEC. 195. Or the spaces between the beams may be filled with hollow tile flat or segmental arches of hard burned clay, semi-porous or porous terra cotta blocks of uniform density and hardness of burn. The shells and webs of hollow tile arch blocks shall not be less than $\frac{5}{8}$ of an inch in thickness, if of dense or semi-porous terra cotta, or 1 inch if of porous terra cotta.

¶Skewbacks shall be used in all forms of brick or hollow tile arches and be of such form and section to properly receive the thrust of the arches. The shells and webs of side-construction skewbacks shall not be less than $\frac{3}{4}$ of an inch in thickness, if of dense or semi-porous terra cotta, or $\frac{7}{8}$ inch if of porous terra-cotta, except that the portion extending under the lower flange of the beams shall not be less than $1\frac{1}{2}$ inches of solid material.

¶The said arches shall be of a depth and sectional area to carry the load to be imposed thereon, without straining the material beyond its safe working load, but the thickness of the shells and webs shall in no case be less than herein required and the depth of hollow tile flat arches shall not be less than $1\frac{1}{2}$ inches per foot of span, not including any portion of the depth of the tile projecting below the under side of the beams.

¶The joints shall be solidly filled with strong Portland cement mortar of 1 part Portland cement, 3 parts sand, and not more than $\frac{1}{10}$ part lime putty, and the arch so constructed that the key parts shall fall as near the central portions as possible.

SEC. 196. Or the space between the beams may be filled with arches of Portland cement concrete, segmental in form, and which shall have a rise of not less than $1\frac{1}{4}$ inches for each foot of span between the beams.

¶The concrete shall be not less than 4 inches in thickness at the crown of the arch and shall be mixed in the proportions required by this Code. These segmental arches shall in all cases be reinforced with steel rods or bars, reticulated or meshed steel, or similar metal weighing not less than 1 pound per square foot. Such reinforcing metal shall be so imbedded that the metal is covered by not less than $1\frac{1}{2}$ inches of concrete.

¶Or the spaces between the beams may be filled with flat arches or slabs of cinder-concrete which shall be used only after a satisfactory test has been approved by the Department. These slabs or arches shall consist of cinder-concrete composed of one part of Portland cement, two parts of sand and five parts of good, clean, anthracite, steam boiler cinders.

¶The depth of the slab shall be sufficient to sustain the load to be imposed thereon, with a factor of safety of six, but the depth shall not be less than three-quarters inch for each foot of span between the beams, and in no case less than 4 inches.

¶The reinforcement shall consist of steel rods or bars of meshed steel metal fabric proportioned to take up all tensional strains but in no case to be less than one pound per square foot of floor area.

¶The concrete fireproofing protection on all beams, girders, and other structural members shall be reinforced with suitable metal clips or fabric.

SEC. 197. Concrete shall not be mixed or deposited at a freezing temperature unless special precautions are taken to avoid the use of materials containing frost, or covered with ice crystals, and to provide means to prevent the concrete from freezing after being placed in position until it is thoroughly hardened. Any concrete damaged by freezing or otherwise shall be removed.

SEC. 198. Or between the said beams may be placed solid or hollow burnt clay, brick, or concrete arches in flat or curved shapes, concrete or fire proof composition slabs, and any of said materials may be used plain or in combination with wire cloth, expanded metal, wire strands, or wrought iron or steel bars; the said metal, if used, to be in all cases so imbedded in the fireproof composition or combination that the metal shall be covered by not less than $1\frac{1}{2}$ inches of fireproof material; but in any unusual construction and as a precedent condition to the same being used, tests shall be made by the United States Bureau of Standards, or by the National Underwriters' Laboratory, or by some state or impartial private laboratory, approved by either of the aforesaid authorities, which is habitually making and is equipped to make tests of building materials. Such tests shall be paid for by the manufacturer, owner, or patentee thereof under the direction and to the satisfaction of the Building Department, and evidence of the same shall be kept on file in the office of the said Department showing the nature and result of the test. Or the Department may accept the evidence of similar tests properly though previously made for other cities or parties.

¶All such tests shall be load, fire, and water tests.

¶Further, the Department may insist upon other reasonable tests by load, fire, and water of any section of such novel construction, or of the regular, standard constructions, if in the Department's estimation the work does not appear to come up to the spirit of the requirement of these regulations.

¶Any system failing to meet the requirements of these tests that shall simulate the conditions to which such construction may be exposed, shall be prohibited from use in any building hereafter erected.

SEC. 199. No filling of any kind which may be injured by frost shall be placed between said floor beams during freezing weather and if the filling is placed during any winter month, it shall be temporarily covered with suitable material for protection from being frozen. Nor shall any other concrete or masonry work or any work than can be seriously affected by frost, any work in the actual structural, weight, pressure sustaining, or fire protecting portions of a building, be done in freezing weather unless such provision for its protection be made as will meet the approval of the Building Department.

SEC. 200. On the top of any arch, lintel, or other device which does not extend to the plane of the under side of the floor finish, cinder concrete or other non-combustible material shall be placed to solidly fill up the space to a level with the top of said floor beams, and shall be carried to the under side of the wood floor boards in case such be used.

¶Cinder concrete for filling shall be made with not less than 1 part of Portland cement to 10 parts of clean cinders, machine mixed. Before such filling, the exposed tops of all beams or other steel work, the metal pipes and wire conduits and any other metal work entering into the construction of or resting upon such floor construction must be well grouted or covered with a coating of tarred-paper, or felt, or Portland cement mortar—something to insure that the cinder concrete will not come in immediate contact with such metal work. The cinder or other concrete filling must entirely embed all the tops of the steel beams and girders and be carried to at least 2 inches above them.

SEC. 201. Under no consideration shall forms be removed until the concrete has hardened sufficiently to permit their removal with perfect safety.

SEC. 202. In laying the floors in masonry buildings, proper provision shall be made to allow for the swelling of floors to prevent throwing out or buckling of walls.

SEC. 203. All fireproof floor systems shall be of sufficient strength to safely carry the load to be imposed thereon without straining the material in any case beyond its safe working load.

SEC. 204. Openings through fireproof floors for pipes, conduits, and similar purposes shall be shown on plans filed with the Building Department.

¶After the floors are constructed, no opening greater than 8 inches square shall be cut through said floors, unless properly boxed or framed around with iron, and such openings shall be filled in with fireproof material after the pipes or conduits are in place.

SEC. 205. All cast-iron, wrought-iron, or rolled-steel columns, including the lugs and brackets on same, used for vertical supports in the interior of any fireproof building, or used to support any fireproof floor, shall be entirely protected with not less than 4 inches of hard burnt brickwork, terra cotta, hollow tile concrete, or other fireproof material, without any air space next to the metal (all voids and spaces to be well grouted with cement), securely applied; but no plaster of paris or lime mortar shall be used for this purpose nor shall any plaster, whether or not on metal lathing, be considered a part of the covering required.

¶Columns of solid terra cotta or of hollow terra cotta in which the sectional area of the open holes in each block shall not exceed 20 per cent of the gross sectional area of such a block, may be used for structural purposes provided the height of such column shall not exceed 12 times the least dimension. The allowable stress shall not exceed 500 pounds per square inch. Such columns shall be of hard burned terra cotta tile of uniform quality, without cracks, with true beds and having ultimate compressive strength of not less than 4,000 pounds per square inch of net area of cross-section of samples tested, and the mortar used in setting these tile columns shall be one part Portland cement and three parts clean, sharp sand thoroughly mixed.

SEC. 206. No single block or unit of insulating material used for column covering shall have a greater vertical dimension than 12 inches when placed in position, nor shall the shell and webs of hollow tile or terra-cotta blocks be less than $\frac{3}{4}$ inch in thickness, and these blocks shall be laid up with Portland cement mortar and the said blocks shall be suitably tied or anchored together, bonded with metal mesh in the joints or wound about with wire or band metal.

¶The extreme outer edges of lugs, brackets, and similar supporting metal may project to within 1 inch of the surface of the fireproofing.

¶The fireproof coverings shall start upon the fireproof floors and continuously extend to within 1 inch of the fireproof ceilings or under side of girders above and be entirely independent of any ornamental base or capital.

¶The 1-inch space left at the top shall be filled with asbestic or other plastic, non-melting and non-inflammable elastic cement, to permit this column covering to expand in fire and to nullify the tendency to "throw out" from the column.

SEC. 207. No pipes, wires, or conduits of any kind shall be incased in the fireproofing surrounding any column, girder, or beam of steel or iron, but shall be placed outside of such fireproofing, although such pipes, wires, and conduits may be within a casing or fireproof covering that will enclose them and the column with its complete fireproofing in one large column, for ornamental purposes.

SEC. 208. Where the fireproof protection of columns is exposed to damage from the trucking or handling of merchandise, such fireproof protection shall be jacketed on the outside, for a height not less than 4 feet from the floor, with sheet metal, or with vertical strips of oak; and if the oak be used for such purpose the vertical strips shall be sufficiently separated from each other always to show that the woodwork of the guard has been placed entirely on the outside of the fireproof material which incases the metal column.

SEC. 209. The exposed sides of wrought-iron or rolled-steel girders supporting walls, iron, or steel floor beams, or supporting floor arches or floors, shall be entirely incased with hard burnt clay, porous terra cotta, hollow tile, concrete, or other fireproof materials not less than 4 inches in thickness, and the bottom and top plates and flanges of such girders shall have not less than 2 inches in thickness of such insulating material.

SEC. 210. The bottom and top plates and flanges of all wrought-iron and rolled-steel floor and roof beams and all exposed portions of such beams below the abutments of floor arches or filling between the floor beams shall be entirely incased with hard burnt clay, porous terra cotta, hollow tile, concrete, or other fireproof material, such incasing material to be not less than $1\frac{1}{2}$ inches thick.

SEC. 211. All incasing material shall be securely attached to the girders and beams.

SEC. 212. The shells and webs of hollow tile blocks used for girders and column coverings shall be of porous terra cotta, hollow tile not less than $\frac{3}{4}$ inch in thickness, and shall be laid up with strong Portland cement mortar, and the said blocks shall be suitably tied or anchored together.

SEC. 213. Where columns are used to support iron or steel girders carrying enclosure walls, the said columns shall be of cast iron, or rolled steel, and

their exposed surfaces shall be constructed to resist fire by having a casing of brickwork not less than 8 inches in thickness on the outside surfaces and all bonded into the brickwork of the enclosure walls.

¶Between the said inclosing brickwork and the columns, there shall be a space of not less than 2 inches, which space (as all other spaces about columns) shall be filled solidly with liquid cement grout as the courses of brickwork are laid.

SEC. 214. The exposed sides of the steel girders shall be similarly covered with brickwork not less than 4 inches in thickness on the outer surface and tied and bonded, but the extreme outer edge of the flanges of beams or plates or angles connected to the beams may project to within 2 inches of the outside surface of the brick casing.

SEC. 215. The inside surfaces of girders may be similarly covered with brickwork, or if projecting inside of the wall, they shall be protected by terra cotta, hollow tile, concrete, or other fireproof material not less than 4 inches in thickness, and with cement grouting next to the metal wherever it is possible to run it.

SEC. 216. Girders for the support of the enclosure walls shall be placed at the floor line of each story.

SEC. 217. The skeleton steel frame of a building shall be independent from that of an adjoining building, and the frame of one building shall not be bolted or riveted in any manner to the frame of any other building.

SEC. 218. No steel-framed or other fireproof building shall be carried higher than twice the width of the street upon which it faces. And in no case, whatever the location, upon however steep a hill, shall any building be over 200 feet from the lowest point of curb level for every 50 feet of its frontage, to the top of the flat roof or to within 6 feet of the top of a pitched gable-roof. Provided, however, that spires, towers, domes, or such vertical projections of limited area—never more than one-half the area—of the building above which they rise, must be built of absolutely fireproof construction and of such height and size as may be approved by the Building Department. And such towers, spires, etc., may only be on the party lines of such lots with the approval of the adjoining owner and the Building Department.

¶Or, such fireproof buildings may be carried up to the full limit of 200 feet provided that they be stepped-back, or receded, at the level of twice the width of the street, and the new line of frontage shall be back to that point, from

the center of the street, that would be established if the street were of such a width as would permit a 200-foot building 50 feet from the center of the street. Provided also that if such buildings back upon an alley they shall only be as high upon that alley as if they extended only to twice the width of the fronting street in height, the extra height to the 200-foot limit shall be carried up 12 feet back from the alley line.

CHAPTER XV

REINFORCED CONCRETE CONSTRUCTION

SEC. 219. *Definition, Plans.*

¶The term "reinforced concrete" means any combination of metal imbedded in concrete to form a structure so that the two materials assist each other to sustain all the stresses imposed. Before a permit to erect any reinforced concrete structure is issued, complete plans and specifications shall be filed with the Department, showing all details of the construction, including detail of working joints, the size and position of all reinforced rods, stirrups or other forms of metal, and giving the composition and proportion of the concrete; provided, however, that permission to erect any reinforced concrete structure does not in any manner approve the construction until after tests have been made of the actual construction to the satisfaction of the Department.

SEC. 220. *Ratio of Moduli of Elasticity, Adhesion, Bond.*

(a) The calculations for the strength of reinforced concrete shall be based on the assumed ultimate compressive strength per square inch designated by the letter "U" given in the table below for the mixture to be used.
(b) The ratio designated by the letter "R" of the modulus of elasticity of steel to that of the different grades of concrete shall be taken in accordance with Table II:

TABLE II
Strength of Concrete Mixtures

MIXTURE	U	R
1 cement, 1 sand, 2 broken stone, gravel or slag	2900	10
1 cement, 1½ sand, 3 broken stone, gravel or slag	2400	12
1 cement, 2 sand, 4 broken stone, gravel or slag	2000	15
1 cement, 2½ sand, 5 broken stone, gravel or slag	1750	18
1 cement, 3 sand, 7 broken stone, gravel or slag	1500	20

SEC. 221. *Unit Stresses for Steel and Concrete.*

- (a) The stresses in the concrete and the steel shall not exceed the following limits:
- (b) Tensile stress in steel shall not exceed one-third of its elastic limits and shall not exceed 18,000 pounds per square inch.
- (c) Shearing stress in steel shall not exceed 12,000 pounds per square inch.
- (d) The compressive stress in steel shall not exceed the product of the compressive stress in the concrete multiplied by the elastic modulus of the steel and divided by the elastic modulus of the concrete.
- (e) Direct compression in concrete shall be one-fifth of its ultimate strength. Bending in extreme fiber of concrete shall be thirty-five one-hundredths of the ultimate strength.
- (f) Tension in concrete on diagonal plane shall be one-fiftieth of the ultimate compressive strength.
- (g) For a concrete composed of one part of cement, two parts of sand, and four parts of broken stone, the allowable unit stress for adhesion per square inch of surface of imbedment shall not exceed the following:

	Pounds per Sq. Inch
On plain round or square bars of structural steel	70
On plain round or square bars of high carbon steel	50
On plain flat bars, in which the ratio of the sides is not more than 2 to 1	50
On twisted bars when the twisting is not less than one complete twist in eight diameters	100

- (h) For specially formed bars, the allowable unit stress for bond shall not exceed one-fourth of the ultimate bond strength of such bars without appreciable slip, which shall be determined by tests made by the person, firm, or corporation to the satisfaction of the Department, but provided that in no case shall such allowable unit stress exceed 100 pounds per square inch of the specially formed bars.

SEC. 222. *Design for Slabs, Beams, and Girders.*

¶ Reinforced concrete slabs, beams, and girders shall be designed in accordance with the following assumptions and requirements:

- (a) The common theory of flexure shall be applied to beams and members resisting bending.
- (b) The adhesion between the concrete and the steel shall be sufficient to make the two materials act together.
- (c) The steel to take all the direct tensile stresses.
- (d) The stress strain curve of concrete in compression is a straight line.

(e) The ratio of the moduli of elasticity of concrete to steel shall be as before specified.

SEC. 223. *Moments of External Forces.*

(a) Beams, girders, floor or roof slabs, and joists shall be calculated as supported or with fixed ends, or with partly fixed ends, in accordance with the actual end conditions, the number of spans, and the design.

(b) When calculated for ends partly fixed for intermediate spans with an equally distributed load where the adjacent spans are of approximately equal lengths:

¶ Bending moment at center of spans shall not be less than that expressed in the formula $\frac{WL^2}{12}$ for intermediate spans and $\frac{WL^2}{10}$ for end spans.

(c) The moment over supports shall not be less than the formula $\frac{WL^2}{18}$ and the sum of the moments over one support and at the center of span shall be taken not less than the formula $\frac{WL^2}{6}$.

¶ In the formula hereinabove given W is the load per linear foot and L is the length of span in feet.

(d) In case of concentrated or special loads the calculations shall be based on the critical condition of loading.

(e) For fully supported slabs, the span shall be taken as the free opening plus the depth; for continuous slabs, the span shall be the distance between centers of supports.

(f) Where the vertical shear measured on the section of a beam or girder between the centers of action of the horizontal stresses, exceeds one-fifth of the ultimate direct compressive stress per square inch, web reinforcement shall be supplied sufficient to carry the excess. The web reinforcement shall extend from top to bottom of beam and loop or connect to the horizontal reinforcement. The horizontal reinforcement carrying the direct stresses shall not be considered as web reinforcement.

(g) In no case, however, shall the vertical shear, measured as stated above, exceed one-fifteenth of the ultimate compression strength of the concrete.

(h) For T-beams the width of the stem only shall be used in calculating the above shear.

(i) When steel is used in the compression side of beams and girders, the rods shall be tied in accordance with requirements of vertical reinforced columns with stirrups connecting with the tension rods of the beams or girders.

(j) All reinforcing steel shall be accurately located in the forms and secured against displacement and properly inspected before any surrounding concrete be put in place. It shall be afterwards completely inclosed by the concrete, and such steel shall nowhere be nearer the surface of the concrete than $1\frac{1}{2}$ inch for columns, $1\frac{1}{2}$ inch for beams and girders, and $\frac{1}{2}$ inch, but not less than the diameter of the bar, for slabs.

(k) The longitudinal steel in beams and girders shall be so disposed that there shall be a thickness of concrete between the separate pieces of steel of not less than one and one-half times the maximum sectional dimension of the steel.

(l) For square slabs with two-way reinforcements, the bending moment at the center of the slab shall not be less than that expressed in the formula

$$\frac{WL^2}{24} \text{ for intermediate spans, and } \frac{WL^2}{20} \text{ for end spans.}$$

(m) The moment over supports shall not be less than the formula $\frac{WL^2}{36}$

and the sum of the moments over one support and at the center of the span

$$\text{shall be taken not less than the formula } \frac{WL^2}{12}.$$

¶In the above formula W is the load per lineal foot and L the length of the span.

(n) For squares or rectangular slabs the distribution of the loads in the two directions, shall be inversely as the cubes of the two dimensions.

(o) Exposed metal of any kind will not be considered a factor in the strength of any part of any concrete structure, and the plaster finish applied over the metal shall not be deemed sufficient protection unless applied of sufficient thickness and so secured as to meet the approval of the Department.

SEC. 224. *Limiting Width of Flange in T-Beams.*

(a) In the calculation of ribs a portion of the floor slab may be assumed as acting in flexure in combination with the rib. The width of the slab so acting in flexure is to be governed by the shearing resistance between rib and slab, but limited to a width equal to one-third of the span length of the ribs between supports and also limited to a width of three-quarters of the distance from center to center between ribs.

(b) No part of the slab shall be considered as a portion of the rib unless the slab and rib are cast at the same time.

(c) Where reinforced concrete girders support reinforced concrete beams, the portion of floor slab acting as flange to the girder must be reinforced with

rods near the top at right angles to the girder, to enable it to transmit local loads directly to the girder and not through the beams.

SEC. 225. *Shrinkage and Thermal Stresses.*

¶Shrinkage and thermal stresses shall be provided for by introduction of steel.

SEC. 226. *Reinforced Concrete Columns—Limit of Length—Per Cent of Reinforcement—Bending Moment on Columns—Tying Vertical Rods.*

(a) Reinforced concrete may be used for columns in which the concrete shall not be leaner than a 1:2:4 mixture and in which the ratio of length to least side or diameter does not exceed 12 but in no case shall the cross-section of the columns be less than 64 square inches. Longitudinal reinforcing rods must be tied together to effectively resist outward flexure at intervals not more than twelve times least diameter of rod and not more than 18 inches. When compression rods are not required, reinforcing rods shall be used, equivalent to not less than one-half of one per cent (.005) of the cross-sectional area of the column; provided, however, that the total sectional area of the reinforcing steel shall not be less than 1 square inch and that no rod or bar be of smaller diameter or least dimension than $\frac{1}{2}$ inch. The area of reinforcing compression rods shall be limited to three per cent of cross sectional area of the column. Vertical reinforcing rods shall extend upward or downward into the column, above or below, lapping the reinforcement above or below enough to develop the stress in rod by the allowable unit for adhesion. When beams or girders are made monolithic with or rigidly attached to reinforced concrete columns, the latter shall be designed to resist a bending moment equal to the greatest possible unbalanced moment in the beams or girders at the columns, in addition to the direct loads for which the columns are designed.

(b) When the reinforcement consists of vertical bars and spiral hooping, the concrete may be stressed to one-fourth of its ultimate strength, provided that the amount of vertical reinforcement be not less than the amount of the spiral reinforcement, nor greater than eight per cent of the area within the hooping; that the percentage of spiral hooping be not less than one-half of one per cent, nor greater than one and one-half per cent; that the pitch of the spiral hooping be uniform and not greater than one-tenth of the diameter of the column, nor greater than 3 inches; that the spiral be secured to the verticals, at every intersection, in such a manner as to insure the maintaining of its form and position, that the verticals be spaced so that their distance apart, measured on the circumference, be not greater than 9 inches, or one-eighth the circumference of the column within the hooping. In such columns the action of the hooping may be

assumed to increase the resistance of the concrete equivalent to two and one-half times the amount of the spiral hooping figured as vertical reinforcement. No part of the concrete outside of the hooping shall be considered as a part of the effective column section.

SEC. 227. *Structural Steel Columns.*

¶When the vertical reinforcement consists of a structural steel column of box shape, with lattice or batten plates of such form as to permit its being filled with concrete, the concrete may be stressed to one-fourth of its ultimate strength, provided that no shape of less than one square inch section be used and that the spacing of the lacing or battens be not greater than the least width of the columns.

SEC. 228. *Curtain Walls in Skeleton Construction Buildings.*

¶Buildings having a complete skeleton construction, or a combination of both, may have exterior walls of reinforced concrete 8 inches thick, provided, however, that such walls shall support only their own weight and that such walls shall have steel reinforcement of not less than three-tenths of one per cent in each direction vertically and horizontally, the rods spaced not more than 12-inch centers and wired to each other at each intersection. All bars shall be lapped for a length sufficient to develop their full stress for the allowable unit stress for adhesion. Additional bars shall be set around openings, the verticals wired to the nearest horizontal bars, and the horizontal bars at top and bottom of openings shall be wired to the nearest vertical bars. The steel rods shall be combined with the concrete and placed where the combination will develop the greatest strength, and the rods shall be staggered or placed and secured so as to resist a pressure of thirty pounds per square foot, either from the exterior or from the interior on each and every square foot of each wall panel.

SEC. 229. *Bending and Elongation of Steel.*

¶The bending and elongation of steel used in reinforced concrete construction shall conform to the following requirements:

(a) Steel having a diameter of $\frac{3}{4}$ -inch or less shall be capable of bending cold ninety degrees over a diameter equal to twice the thickness of the piece without fracture; steel over $\frac{3}{4}$ -inch in diameter shall be capable of bending cold to ninety degrees over a diameter equal to three times the diameter of the piece.

(b) The material of reinforcement shall be such form that it will not elongate under working stress to exceed one fifteen-hundredth.

(c) Reinforcing steel used in reinforcing concrete construction shall not be painted but shall be free from all mill scale and loose rust.

SEC. 230. *Cement Tests.*

(a) Only Portland cement shall be used in reinforced concrete construction. All cement shall be tested in car load lots when delivered, or in quantities equal to the same. Cement failing to meet the requirements of accelerated test shall be rejected.

(b) Parts of neat cement must be allowed to harden twenty-four hours in moist air, and then be submitted to the accelerated test as follows: A pat is exposed in any convenient way in an atmosphere of steam, and above boiling water, in a loosely closed vessel for three hours, after which before the pat cools, it is placed in the boiling water for five additional hours. To pass this test satisfactorily, the pat shall remain firm and hard and show no signs of cracking, distortion, or disintegration.

(c) Portland cement when tested shall have a minimum tensile strength as follows: Neat cement after one day in moist air shall develop a tensile strength of at least 200 pounds per square inch; after one day in air and six days in water shall develop a tensile strength of at least 500 pounds per square inch, and after one day in air and twenty-seven days in water, shall develop a tensile strength of at least 600 pounds per square inch. Cement and sand tests composed of one part of cement and three parts of sand shall, after one day in air and six days in water, develop a tensile strength of at least 175 pounds per square inch; and after one day in air and twenty-seven days in water, shall develop a tensile strength of at least 240 pounds per square inch.

(d) A certificate that the cement used has been tested and has met the requirements of this section and that the tests have been made in accordance with the standard methods prescribed by the American Society for Testing Materials, on pages 149 to 164, both inclusive, of the Proceedings of the Eleventh Annual Meeting of the American Society for Testing Materials, adopted August 15, 1908, shall be furnished to the Department by the architect or engineer in charge.

SEC. 231. *Sand.*

¶The sand to be used for concrete shall be clean, hard, coarse sand, of the grade known as torpedo sand, and free from loam or dirt; not less than 45 per centum shall be returned on a screen of 400 mesh to the square inch.

SEC. 232. *Stone.*

¶The stone to be used in concrete shall be clean crushed hard stone or clean crushed blast furnace slag or gravel of a size to pass through a 1-inch square mesh. If limestone or slag is used, it shall be screened to remove all dust; if gravel is used it shall be thoroughly washed. Stone shall be

drenched immediately before using. If slag is used, it shall be of such character that when made into concrete the concrete will develop a crushing strength equal to that specified for stone or gravel concrete.

SEC. 233. *Mixing.*

¶All concrete shall be mixed in a mechanical mixer, except when limited quantities are required, or when the conditions of the work make hand mixing preferable; hand mixing to be done only when approved by the Department. In all mixing, the separate ingredients shall be measured and shall be thoroughly mixed and must be uniform in color, appearance, and consistency, before placing.

SEC. 234. *Placing Concrete.*

¶In filling in concrete around reinforcing steel, the concrete must be worked continuously with suitable tools, as it is put in place. Filling the forms completely and puddling afterwards will not be permitted. In placing the concrete, the work shall be so laid out that partly set concrete will not be subjected to shocks from men wheeling or handling material over it.

SEC. 235. *Concrete Placed in Freezing Weather.*

¶When concreting is carried on in freezing weather, the material must be heated, and such provisions made that the concrete can be put in place without freezing. The use of frozen, lumpy sand or stone depending on hot water used in mixing to thaw it out will not be permitted. All reinforced concrete shall be kept at a temperature above freezing for at least forty-eight hours after being put in place. All forms under concrete placed in freezing weather shall remain until all evidences of frost are absent from the concrete and the natural hardening of the concrete has proceeded to the point of safety.

SEC. 236. *Concrete Placed in Warm Weather.*

¶Concrete laid in warm weather shall be drenched with water twice daily, Sunday included, during the first week after being put in place.

SEC. 237. *Cement Finish.*

¶Cement finish added to the top of slabs, beams, or girders, shall not be calculated in the strength of a member unless laid integrally with the rough concrete. No greater unit stress shall be allowed on such cement finish than on the rough concrete.

SEC. 238. *Fireproof Concrete Construction.*

¶Reinforced concrete construction will be accepted for fireproof buildings

if designed as prescribed in this paragraph. The aggregate for such concrete shall be clean, broken stone or clean crushed blast furnace slag, or clean screened gravel, together with clean, coarse sand of the grade known as torpedo sand; stone, slag, or gravel shall be of a size to pass through a screen of $\frac{3}{4}$ inch mesh. The minimum thickness of concrete surrounding the reinforcing members of reinforced concrete beams and girders shall be 2 inches on the bottom, and $1\frac{1}{2}$ inches on the sides of said beams and girders. The minimum thickness of concrete under slab rods shall be 1 inch; and all reinforcement in columns shall have a minimum protection of 2 inches of concrete except as hereinafter provided, if a supplementary metal fabric is placed in the concrete surrounding the reinforcing, simply for holding the concrete, the thickness of concrete under the reinforcing may be reduced by one-half inch, then such fabric shall not be considered as reinforcing metal.

SEC. 239. *Removal of Forms.*

¶In no case shall the props and shores used in reinforced concrete construction be removed from under floors and roofs in less than two weeks, except as is provided herein. Column forms shall not be removed in less than four days. ¶The centering from bottom of slabs and sides of beams and girders may be removed after the concrete has set for one week, if the floor has obtained sufficient hardness to sustain the dead weight of the said floor. No load or weight shall be placed on any portion of the construction until the concrete has fully set and the centers have been removed.

SEC. 240. *Tests.*

¶The contractor for the reinforced concrete construction shall make load tests on any portion of the work within a reasonable time after erection, as may be required by the Department. Such tests must be made under the direction of the Department and must show that the construction will sustain a load twice the sum of the live and dead loads for which it was designed, without any sign of failure. The construction may be considered as part of the test load. Each test load shall cover two or more panels and shall remain in place at least twenty-four hours. The deflection under the full test load at the expiration of twenty-four hours shall not exceed one eight-hundredth of the span. These tests shall be considered as tests of workmanship only.

SEC. 241. *Fire Protection.*

¶Wherever reinforced concrete is used in buildings over 3 stories high, such reinforced concrete construction, all columns, girders, and beams shall have a protecting covering of at least 1 inch of non-combustible material

on all exposed surfaces, over and above the thicknesses and sizes required structurally in these reinforced concrete members. Cinder concrete, clay tiles, or plaster on wire lath are acceptable materials for this fire protection.

SEC. 242. *Supervision.*

¶The execution of all reinforced concrete work shall be done under the direct and constant supervision of a competent foreman or superintendent.

¶These foremen or superintendents must be enrolled, examined, classified, and licensed by or at the instance of the Building Department. Examinations may be held at regular intervals and an eligible list kept of men classified as to ability to carry on the different grades of work, for no concrete construction shall be carried on save under the direction of one of these duly licensed superintendents of whose ability the Department must be thoroughly satisfied; and a first-class, important building shall not be superintended by one who is qualified only to look after a second-class, inferior building.

¶Further, these superintendents must report the progress, condition, and character of the work in their charge at least once a week to the Building Department. They are to be virtually employes or inspectors of the Department but paid by the owners or builders of the buildings. They are to be held responsible to the Department for that work and must report any attempted violation of these rules of which they may in any way become cognizant. In the event of their carelessness with the work in their charge or any connivance in the evasion of these requirements, or other wrong doing or incompetence, the Building Department may discharge them, suspend them, remove them, place them upon less important work or revoke their license entirely and bar them from any such superintendence in the City.

CHAPTER XVI

REINFORCED TERRA COTTA HOLLOW TILE

SEC. 243. The term reinforced hollow tile is hereby defined to mean a system of hollow burned clay tile in combination with reinforced concrete, in which combination the hollow tile may be used to resist compressive and shearing stresses subject to the following provisions:

¶The provisions relating to reinforced concrete construction shall hold as far as applicable to this system.

¶All tile to be hard burned terra cotta tile of uniform quality, free from shrinkage cracks, with true beds and having an ultimate compressive strength of not less than 3,000 pounds per square inch of net area of surface tested.

¶The following stresses and values shall not be exceeded: Extreme fiber stress (compressive) on hollow tile, 500 pounds per square inch.

¶Shearing stress on hollow tile, 200 pounds per square inch.

¶Adhesion between tile and 1:2:4 concrete to 1:3 cement mortar, 40 pounds per square inch.

¶Ratio of modulus of elasticity of steel to that of tile with cement mortar joints, 10.

SEC. 244. *Special Provisions as to Workmanship in Reinforced Hollow Tile Construction.*

¶The hollow tile shall be thoroughly soaked with water at the time concrete is poured and be kept drenched for at least thirty-six hours afterwards. The joints between tiles shall be staggered, buttered, and slushed full of mortar consisting of one (1) part of Portland cement and three (3) parts of clean, sharp sand, thoroughly mixed.

SEC. 245. *Terra Cotta Tile Columns.* See Section 205.

SEC. 246. *Special Provisions as to Workmanship in Tile Column Construction.*

¶All terra cotta tile must be thoroughly wet before using and when used in columns must be set on end with the voids running vertically and with the webs in line of pressure.

¶All vertical joints must stagger and terra cotta blocks just be of proper dimensions to meet this condition as no broken tile will be allowed.

¶All work to be set plumb, with uniform horizontal joints, thickness to average $\frac{3}{8}$ inch. The minimum time which shall elapse between the finishing of the work and before any load is placed thereon shall be not less than seven days.

SEC. 247. *Terra Cotta Tile Walls.*

¶Hollow tile may be used for building primary bearing walls, which are defined as walls that may be used to receive directly the loads from floors or roofs in addition to their acting as partition walls, provided the proportion between thickness of wall and free height between the floors does not exceed fifteen and the load including the weight of the construction does not exceed three hundred and fifty pounds per square inch of net sectional area of tile. The thickness of walls shall be calculated as the outside dimensions of the tile and each tile shall be full thickness of wall. The thickness of the plastering is not to be included as a part of the thickness of the wall. Walls having a thickness of 4 inches may be used when the height does not exceed 5 feet. The quality of the tile and mortar and special provisions as to workmanship as specified for terra cotta columns shall apply to terra cotta tile walls.

SEC. 248. *Terra Cotta Grain Bin Construction.*

¶Fireproof storage bin, grain elevators and grain warehouses may be built in cylindrical form with terra cotta tile of such height, diameter and thickness as is allowed by safe engineering practices, provided that the material shall not be stressed in excess of the limits prescribed in this chapter for walls and columns.

CONCRETE BUILDING BLOCKS

SEC. 249. Hollow concrete building blocks may be used for buildings five stories or less in height where their use is approved by the Building Department, provided, however, that the concrete shall be composed of at least one part of Standard Portland cement, and not to exceed five parts of clean, coarse, sharp sand or gravel, or a mixture of at least one part of Portland cement to five parts of crushed rock or other suitable aggregate. Provided, further, that this section shall not permit the use of any kind of hollow blocks in party walls. Said party walls must be built solid.

¶All concrete material shall be of such fineness as to pass a $\frac{1}{2}$ -inch ring and be free from dirt or foreign matter. The material composing all such blocks shall be properly mixed and manipulated and the hollow space in said blocks shall be properly proportioned.

SEC. 250. Where the face only is of hollow building blocks and the backing is of brick, the facing of hollow blocks must be strongly bonded to the brick either with headers 4 inches into the brickwork—every fourth course being a heading course—or with approved ties; no brick backing shall be less than 8 inches. Where the walls are made entirely of hollow blocks, but where said blocks have not the same width as the wall, every fifth course shall extend through the wall forming a secure bond. All walls where blocks are used, shall be laid up in Portland cement mortar; two parts sand, one part Portland cement.

SEC. 251. All hollow concrete building blocks, before being used in the construction of any building in the city, shall have attained an age of at least four weeks.

SEC. 252. Wherever girders or beams or joists rest upon walls so that there is a concentrated load on the block of over 1 ton, the blocks supporting the girder or joists must be made solid. Where such concentrated load shall exceed 3 tons, the blocks for two courses below and for a distance extending at least 18 inches each side of said girder, shall be made solid. Where the load on the wall from the girder exceeds 5 tons, the blocks for three courses beneath it shall be made solid with material similar to that in the blocks. Wherever walls are decreased in thickness, the top course of the thicker shall be solid.

¶Provided, always, that no wall, or any part thereof, composed of hollow concrete blocks shall be loaded to an excess of 8 tons per superficial foot of the area of such blocks, including the weight of the wall.

¶No block shall have an average crushing strength of less than 2,000 pounds per square inch when the blocks are tested (at twenty-eight days for concrete), where the strength is figured on the effective net section.

SEC. 253. All piers and buttresses that support loads in excess of 5 tons, shall be built of solid blocks for such distances below as may be required by the Building Department, and any lintels spanning over 4 feet 6 inches in the clear shall rest on solid blocks.

¶Provided, that no hollow building blocks shall be used in the construction of any building in the City unless the maker of said blocks has submitted the product to the full test required by the Building Department, which may also require a renewal of such tests from time to time to insure that the standard and character of the work is kept up.

¶A brand or mark of identification must be impressed in, or otherwise permanently attached to, each block for purpose of identification.

¶The manufacturer and user of any such hollow blocks, as are mentioned in this regulation, or either of them, shall at any and all times have made such tests of the cements or clays used in making such blocks, or such further tests of the completed blocks, or of each of these, at their own expense, and under the supervision of the Building Department, as it shall require.

SEC. 254. The cement used in making said concrete blocks shall be Portland cement, and must be capable of passing the minimum requirements as set forth in the "Standard Specifications for Cement" by the American Society for Testing Materials.

¶Any and all blocks, samples of which, on being tested under the direction of the Building Department, fail to stand (at twenty-eight days for concrete), the tests required by this regulation, shall be marked "condemned" by the manufacturer or user and shall be destroyed.

¶No concrete blocks shall be used in the construction of any building within the City until they have been inspected, and average samples of the lot tested, approved, and accepted by the Building Department.

SEC. 255. These regulations shall apply to all such new materials as are used in building construction, in the same manner and for the same purpose as stone, brick, and concrete are now authorized by the Building Laws, when said new material to be substituted departs from the general shape and dimensions of ordinary building brick.

¶Before any such material is used in buildings, an application for its use and for a test of the same must be filed with the Building Department. A description of the material and a brief outline of its manufacture and proportions of the materials used must be embodied in the application.

SEC. 256. The material must be subjected to the following tests: *transverse, compression, absorption, freezing, fire, and water*. Additional tests may be called for when, in the judgment of the Building Department, the same may be necessary. All such tests must be made as heretofore directed. The tests will be made at the expense of the applicant.

¶The results of the tests, whether satisfactory or not, must be filed with the Building Department. They shall be open to inspection upon application to the Building Department.

SEC. 257. For the purposes of the tests, at least twenty samples or test pieces must be provided. Such samples must represent the ordinary commercial product. They may be selected from stock by the Building Department.

TERRA COTTA BUILDING BLOCKS

SEC. 258. Terra cotta hollow tile may be used for bearing walls in buildings five stories or less in height, or for enclosure walls for skeleton structures of any height where the wall is carried from story to story, on steel or concrete beams or girders, where said use is approved by the Department. Provided that this section shall not permit the use of hollow tile in party walls, which must be built solid.

SEC. 259. All material must be well burned, dense material of approved quality and thickness.

SEC. 260. The thickness of the walls shall not be less than is required by law for brick walls, except where hollow tile blocks are used as a substitute for wood construction. The exterior walls shall be not less than the following thicknesses:

- (a) For a one story building, 6 inches.
- (b) For a two story building, first story 8 inches, second story 6 inches.
- (c) For a three story building, first story 10 inches, second story 8 inches, third story 8 inches.
- (d) For a four story building, first story 12 inches, second story 10 inches, third story 8 inches, fourth story 8 inches.
- (e) For a five story building, first story 12 inches, second story 10 inches, third story 10 inches, fourth story 8 inches, and fifth story 8 inches.
- (f) The foundation walls shall be not less than 4 inches thicker than the first story walls, provided that no foundation wall shall be less than 12 inches thick.

SEC. 261. If the walls are exposed to the weather, all the hollow tile must be of dense material, and vitrified in burning, or they may be dense material, hard burned and covered on the exposed sides with at least 1 inch of Portland cement stucco or pebble dash. Such hollow tile to be well scored with dove-tailed grooves to receive cement coating.

SEC. 262. Wherever girders or beams rest upon a wall so that there is a concentrated load on the hollow tile of over two tons, the tile supporting the girder or beam must be made solid by filling with Portland cement concrete of broken stone or gravel mixed 1:2:4 or by covering the openings with flat slabs or brick, and wherever walls are decreased in thickness the top course of the thicker wall must be made solid in the same manner.

SEC. 263. Provided, always, that no tile shall be loaded in excess of 300 pounds per square inch of net section in compression, if set on end, or 150 pounds per square inch, if set on the side.

SEC. 264. All piers and buttresses that support loads in excess of five tons shall be laid solid with Portland cement concrete.

SEC. 265. Lintels spanning over 4 feet 6 inches in the clear shall rest on tile filled solid with concrete.

SEC. 266. All hollow tile work shall be subject to the regular inspection provided for by this code for other masonry building materials. The ultimate crushing strength shall be at least seven times the load it is required to support

SEC. 267. All hollow tile used in walls or piers shall be set in mortar composed of one part Portland cement and three parts of clean sand.

CHAPTER XVII

STEEL AND WROUGHT-IRON CONSTRUCTION

SEC. 268. No part of a steel or wrought-iron column shall be less than $\frac{1}{4}$ -inch thick.

SEC. 269. No wrought-iron or rolled-steel column shall have an unsupported length of more than forty times its least lateral dimension or diameter, except as prescribed in this Code, and also except in cases where the Building Department may specially allow a greater unsupported length.

SEC. 270. The ends of all columns shall be faced to a plane surface at right angles to the axis of the columns, and the connection between them shall be made with splice plates.

¶The joint shall be effected by rivets of sufficient size and number to transmit the entire stress, and the splice plates shall be equal in sectional area to the area of the column spliced.

SEC. 271. When the section of the columns to be spliced is such that splice plates cannot be used, a connection formed of plates and angles may be used, designed to properly distribute the stresses.

SEC. 272. No material, whether in the body of the column or used as lattice-bar or stay-plate, shall be used in any wrought-iron or steel-column of less thickness than $\frac{1}{16}$ of its unsupported width measured transversely between centers of rivets, or $\frac{1}{16}$ of the distance between centers of rivets in the direction of the stress.

SEC. 273. Stay-plates are to have not less than four rivets, and are to be spaced so that the ratio of the length to the least radius of gyration of the parts connected does not exceed 40; in this case the distance between the nearest rivets of two stay-plates shall be considered as the length.

SEC. 274. Steel and wrought-iron columns shall be made in one, two, or three story lengths, and the material shall be rolled in one length wherever practicable to avoid intermediate splices. In placing these columns in buildings they shall be "broken-jointed," the splices alternating to prevent hinging at floor levels.

SEC. 275. Where any part of the section of a column projects beyond that of the column below, the difference shall be made up by filling plates secured to, column by the proper number of rivets.

SEC. 276. Shoes of iron or steel, as prescribed for cast-iron columns, or built shoes of plates and shapes may be used to comply with the same requirements.

¶Nothing herein shall prohibit the use of a wrought-iron shell of standard thickness filled with concrete approved by the Building Department.

SEC. 277. Cast-iron columns shall be of good workmanship and material and have a diameter of not less than 5 inches and a shell of a thickness not less than $\frac{3}{4}$ inch, except that $\frac{5}{8}$ inch may be used for light construction.

¶These columns shall not have an unsupported length of more than 20 times their lateral dimension or diameter, except as stated in the tables of this Code, and except the same shall form a part of a staircase, and also except in such specific cases where the Building Department may specially allow a greater unsupported length.

¶The top and bottom flanges, seats, and lugs shall be of ample strength, reinforced by fillets and brackets; they shall be not less than 1 inch in thickness when finished.

¶All columns shall be faced at the ends to a plane surface at right angles to the axis of the column.

SEC. 278. Where cast-iron columns are placed vertically one on top of another, they shall be securely bolted together at the joints through flanges cast on the columns and a plate between the flanges. If the column is square or rectangular, the top flange shall project not less than $2\frac{1}{2}$ inches from the outer surfaces of the column on all sides, and the bottom flange of the column immediately above the same shall project as far as the top flange of the column below.

¶If the column is round or many sided, the top flange shall project not less than $2\frac{1}{2}$ inches at its least projection from the outer surface of the column, and be square or rectangular in shape, and the bottom flange of the column immediately above the same shall be of corresponding shape and project as far as the top flange of the column below. Each flange shall be reinforced with a bracket placed centrally on the column and with fillets both on the bracket and the flange.

¶In case the column is placed on the dividing line of the lot upon which the Building is to be erected, the flanges on that side only may be omitted.

SEC. 279. Between the joints of cast-iron columns placed vertically over each other, there shall be in each case a solid cast-iron plate not less than

1½ inches in thickness, of the same dimensions as the flanges of the columns and planed true on both sides; a plate of mild steel, not less than ⅝ inch thick, may be used instead of the cast-iron plate.

¶The columns shall be bolted together with bolts not less than ¾ inch in diameter passing through the two flanges and the intermediate plate, the bolts being of sufficient length to allow the nuts to be screwed up tightly; and as each column is placed in position, the bolts shall also be placed in position and the nuts shall be tightly screwed up. One bolt shall be placed at each corner of the plate and flanges and the number of bolts shall never be less than four. The holes for these bolts shall be drilled to a template.

¶Where cast-iron columns are placed vertically one on top of the other, the diameters shall be increased, in the case of round columns, not less than 1 inch for each two stories below the columns on the two stories above, and in the case of square or rectangular columns, the same ratio of increase shall follow on at least two sides of the columns in each two stories below the uppermost two columns of the vertical line. This increase in size shall apply to interior as well as to exterior columns.

SEC. 280. The core of a column below a joint shall not be larger than the core of the column above, and the metal shall be tapered down for a distance of not less than 6 inches.

SEC. 281. Wherever the core of a cast-iron column has shifted more than one-fourth the thickness of the shell, the strength shall be computed on the assumption that the thickness of the metal all around is equal to the thinnest part, and the columns shall be condemned and rejected if this computation shows the strength to be less than required by this Code.

SEC. 282. Wherever blowholes or imperfections are found in a cast-iron column which reduces the area of the cross-section at that point more than ten per cent, such column shall be condemned and rejected.

SEC. 283. Cast-iron posts or columns not cast with one open side or back, before being set up in place, shall have a ⅜-inch hole drilled in the shaft of each post or column by the manufacturer or contractor furnishing the same in order to exhibit the thickness of the castings; and any other hole or holes of a similar size which the Building Department may require, shall be drilled in the said posts or columns by the said manufacturer or contractor at their expense.

SEC. 284. Iron or steel shoes or plates shall be used under the bottom tier of columns when necessary to properly distribute the load on the foundation.

¶Shoes shall be planed on top.

SEC. 285. In all buildings hereafter erected or altered, where any iron or steel columns are used to support a wall or part thereof—whether the same be an exterior or an interior wall—and where columns, located below the level of the sidewalk, are used to support exterior walls or arches over vaults, the said column or columns shall be either constructed double, that is, an outer and an inner column, the inner column alone to be of sufficient strength to sustain safely the weight to be imposed thereon, and the outer column to be 1 inch shorter than the inner columns, or such other iron or steel column of sufficient strength shall be protected with not less than 4 inches of hard burned brickwork, terra cotta, concrete, or other approved fireproof material securely applied.

SEC. 286. If iron or steel posts are to be used as party posts in front of a party wall and are intended for two buildings, then the said posts shall not be less in width than the thickness of this party wall, nor less in depth than the thickness of the wall to be supported above.

¶Iron or steel posts in front of side, division, or party walls shall be made perfectly tight between the posts and walls with masonry.

¶Intermediate posts may be used, which shall be sufficiently strong, and the lintels thereon shall have sufficient bearings to carry the weight above with safety.

SEC. 287. Rivets in flanges shall be so spaced that the least value of a rivet for either shear or bearing is equal to or greater than the increment of strain due to the distance between adjoining rivets. All other rules given under riveting shall be followed. The length of rivets between heads shall be limited to four times the diameter. The compression flanges of plate girders shall be secured against buckling if their length exceed thirty times their width.

SEC. 288. If splices are used they shall be of such strength as to bring the members spliced up to the standard in either tension or compression.

¶Stiffeners shall be provided over supports and under concentrated loads; they shall be of sufficient strength, as a column, to carry the loads, and shall be connected with a sufficient number of rivets to transmit the stresses into the web plate. Stiffeners shall fit so as to support the flanges of the girders. If the unsupported depth of the web plate exceeds sixty times its thickness, stiffeners shall be used at intervals not exceeding one hundred and twenty times the thickness of the web.

SEC. 289. When rolled steel or wrought iron beams are used in pairs to form a girder, they shall be connected by bolts and iron separators at intervals of not more than 5 feet.

¶All beams 12 inches and over in depth shall have at least two bolts to each separator.

SEC. 290. Cast-iron lintels shall not be used for spans exceeding 8 feet.

¶Cast-iron lintels or beams shall not be less than $\frac{3}{4}$ inch in thickness in any of their parts.

SEC. 291. When the lintels or girders are supported at the ends by brick walls or piers, they shall rest upon cast-iron or steel plates, or stone templates of adequate strength to properly distribute the load on the bearings.

¶In all cases the safe loads shall not exceed those fixed by this Code.

SEC. 292. All rolled-steel and wrought-iron floor and roof beams used in buildings shall be of full weight, straight, and free from injurious defects.

SEC. 293. Holes for tie rods shall be placed as near the thrust of the arch as practicable.

¶The distance between tie rods in floors shall not exceed 8 feet, and shall not exceed eight times the depth of floor beams 12 inches and under.

SEC. 294. Channels or other shapes, where used as skewbacks, shall have a sufficient resisting moment to take up the thrust of the arch.

¶Bearing plates of metal or stone shall be used to reduce the pressure on the wall to the working stress.

SEC. 295. Beams resting on girders shall be securely riveted or bolted to the same where joined on a girder; tie straps of $\frac{1}{2}$ -inch net sectional area shall be used, with rivets or bolts to correspond.

¶Anchors shall be provided at the ends of all such beams bearing on walls.

SEC. 296. Under the ends of all iron or steel beams where they rest on the walls, cast-iron or steel templates shall be built into the walls.

¶Templates under ends of steel or iron beams shall be of such dimensions as to bring no greater pressure upon the brickwork than that allowed in this Code.

¶When rolled iron or steel floor beams, not exceeding 6 inches in depth, are placed not more than 30 inches on centers, no templates shall be required.

¶Granite or bluestone templates of not less than 5 inches in thickness may be substituted for iron or steel.

SEC. 297. All iron or steel trimmer-beam headers, and tail beams shall be suitably framed and connected.

¶The iron or steel girders, columns, beams, trusses, and all other iron

work of all floors and roofs shall be strapped, bolted, anchored, and connected to the walls.

¶All beams framed into and supported by other beams or girders shall be connected thereto by angles or knees of a proper size and thickness, and have sufficient bolts or rivets in both legs of each connecting angle to transmit the entire weight or load coming on the beam to the supporting beam or girder.

¶In no case shall the shearing value of the bolts or rivets or the bearing value of the connection angles, provided for in this Code, be exceeded.

SEC. 298. The distance from the center of a rivet hole to the edge of the material shall not be less than

$\frac{5}{8}$ inch for.....	$\frac{1}{2}$ inch rivets
$\frac{7}{8}$ inch for.....	$\frac{5}{8}$ inch rivets
$1\frac{1}{8}$ inches for.....	$\frac{3}{4}$ inch rivets
$1\frac{1}{2}$ inches for.....	1 inch rivets

Wherever possible, however, the distance shall be equal to two diameters.

SEC. 299. All rivets, wherever practicable, shall be machine-driven. The rivets in connections shall be proportioned and placed to suit the stresses. The pitch of rivets shall never be less than three diameters of the rivet nor more than 6 inches. In the direction of the stress, it shall not exceed sixteen times the least thickness of the outside member. At right angles to the stress, it shall not exceed thirty-two times the least thickness of the outside member.

¶All holes shall be punched accurately, so that upon assembling a cold rivet will enter the hole without straining the material by drifting. Occasional slight errors shall be corrected by reaming.

¶The rivets shall fill the holes completely and the heads shall be hemispherical and concentric with the axis of the rivet.

¶Wherever required, gussets shall be provided of sufficient thickness and size to accommodate the number of rivets necessary to make a connection.

SEC. 300. Where riveting is not practicable or possible, connections may be effected by bolts. These bolts shall be of wrought iron or mild steel and they shall have U. S. Standard threads. The threads shall be full and clean, the nut shall be truly concentric with the bolt, and the thread shall be of sufficient length to allow the nut to be screwed up tightly.

SEC. 301. When bolts go through bevel flanges, bevel washers to match shall be used, so that head and nut of bolts are parallel.

SEC. 302. When bolts are used for suspenders, the working stresses shall

be reduced for wrought iron to 10,000 pounds and for steel to 14,000 pounds per square inch of net area, and the load shall be transmitted into the head or nut by strong washers, distributing the pressure evenly over the entire surface of the same.

SEC. 303. Turned bolts in reamed holes shall be deemed a substitute for field rivets, but the diametrical clearance shall not exceed $\frac{1}{16}$ inch if turned bolts are used. Column connections and main girder connections shall be riveted.

SEC. 304. Trusses shall be of such design that the stresses in each member can be calculated.

¶All trusses shall be held rigidly in position by efficient systems of lateral and sway-bracing struts, these being spaced so that the ratio of maximum limit of length to least radius of gyration, established by this Code, is not exceeded.

¶Any member of a truss subjected to transverse stress, in addition to direct tension or compression, shall have the stresses causing such strain added to the direct stresses coming on the member, and the total stresses thus formed shall in no case exceed the working stresses stated in this Code.

SEC. 305. For tension members, the actual net area only, after deducting rivet holes $\frac{1}{8}$ inch larger than the rivets, shall be considered as resisting the stress.

¶If tension members are made of angle irons riveted through one flange only, only that flange shall be considered in proportioning areas. Rivets shall be proportioned as prescribed in this Code.

SEC. 306. If the axes of two adjoining web members do not intersect within the line of the chords, sufficient area shall be added to the chord to take up the bending strains, or the web members shall be connected by plates so arranged that the axes of the web members prolonged will intersect on the axis of the chord.

SEC. 307. No bolts shall be used in the connections of riveted trusses, excepting when riveting is impracticable and then the holes shall be drilled or reamed.

SEC. 308. The bending stresses on pins shall be limited to 20,000 pounds for steel and 15,000 pounds for wrought iron.

SEC. 309. All compression members in pin-connected trusses shall be proportioned, using seventy-five per cent of the permissible working stress for columns. The heads of all eyebars shall be made by upsetting or for-

ging. No weld will be allowed in the body of the bar. Steel eyebars shall be annealed. Bars shall be straight before boring.

SEC. 310. All pin-holes shall be bored true, and at right angles to the axis of the members, and must fit the pin within $\frac{1}{32}$ inch. The distance of pin-holes from center to center for corresponding members shall be alike, so that, when piled upon one another, pins will pass through both ends without forcing.

SEC. 311. Eyes and screw ends shall be proportioned so that upon test to destruction, fracture will take place in the body of the member.

SEC. 312. All pins shall be accurately turned.

SEC. 313. Pin-plates shall be provided wherever necessary to reduce the stresses on pins to the working stresses prescribed in this Code. These pin-plates shall be connected to the members by rivets of sufficient size and number to transmit the stresses without exceeding working stresses.

SEC. 314. All rivets in members of pin-connected trusses shall be machine-driven. All rivets in pin-plates which are necessary to transmit stress shall be also machine-driven.

SEC. 315. The main connections of members shall be made by pins. Other connections may be made by bolts.

¶If there is a combination of riveted and pin-connected members in one truss these members shall comply with the requirements for pin-connected trusses; but the riveting shall comply with the requirements of this Code.

SEC. 316. All cast-iron or metal front plates shall be backed up or filled in with masonry of the thickness as provided for walls and piers in this Code.

SEC. 317. Where surfaces in riveted work come in contact with each other, they shall be painted before assembling.

¶Paint shall not be required for metal structural work which is to be thoroughly imbedded in concrete or cement grout applied directly against the metal except where surfaces in riveted work come in contact with each other.

¶All metal structural work that is not to be thoroughly imbedded in concrete or cement grout shall be cleaned of all scales, dust, dirt, and rust, and thoroughly coated with at least one coat of suitable paint; after erection, all such work shall be painted at least one additional coat of another color.

¶Cast-iron columns shall not be painted or covered until after inspection by the Building Department.

SEC. 318. All iron or steel used under water shall be inclosed in concrete.

CHAPTER XVIII

PUBLIC BUILDINGS, THEATERS, PLACES OF ASSEMBLAGE

SEC. 319. In all public buildings, or buildings of a public character, such as hotels, churches, theaters, restaurants, railroad depots, public halls, schools, and other buildings used or intended to be used for purposes of large public assemblage, amusement, or instruction, and including department stores and other business and manufacturing buildings where large numbers of people are congregated, the halls, doors, and stairways, seats, passageways, and aisles, and all lighting and heating appliances and apparatus shall be arranged as the Building Department shall direct to facilitate egress in cases of fire or accident and to afford the requisite and proper accommodation for the public's protection.

SEC. 320. All aisles and passageways in said buildings shall be kept free from camp-stools, chairs, benches, and other obstructions, and no person shall be allowed to stand in or occupy any of said aisles other than an employe, or policeman, or fireman, during any performance, service, exhibition, lecture, concert, ball, or any public assemblage.

SEC. 321. The Building Department at any time may serve a written or printed notice upon the owner, lessee, or manager of any of said buildings, directing any act or thing to be done or provided in or about the said buildings and the several appliances therewith connected—such as halls, doors, stairs, windows, seats, aisles, fire-walls, fire apparatus, and fire escapes—as it may deem necessary.

SEC. 322. Nothing herein contained, however, shall be construed to authorize or require any other alterations to theaters existing prior to the date of this Code than are specified in this chapter.

SEC. 323. Every theater or opera house or other building hereafter erected which is intended to be used for theatrical or entertainment purposes or for public resort or entertainments of any kind, for the accommodation of more than three hundred persons, shall be built to comply with the requirements of this chapter.

SEC. 324. No building, which, at the time of the passage of this Code, is not in actual use for theatrical or entertainment purposes, and no build-

ing hereafter erected, not in conformity with the requirements of this chapter, shall be used for theatrical or operatic purposes, or for public entertainments of any kind until the same shall have been made to conform to the requirements of this chapter.

SEC. 325. No building hereinbefore described shall be opened to the public for theatrical or entertainment purposes, or for public entertainments of any kind, until the Building Department shall have approved the same in writing as conforming to the requirements of this chapter, nor until the Building Department shall have certified in writing that all the appliances for the extinguishing of fire or guarding against the same, conform to this Code and to the special requirements of this Chapter and are in a complete and satisfactory working condition.

¶Every such building shall have at least one front on the street and in such front there shall be suitable means of entrance and exit for the audience.

¶In addition to the aforesaid entrances and exits on the street, there shall be reserved for service in case of an emergency an open court or space on the side not bordering on the street, where said building is located on a corner lot; and on both sides of said building, where there is but one frontage on the street. The width of such open court or courts shall be not less than 6 feet where the seating capacity does not exceed one thousand people; exceeding one thousand and not more than eighteen hundred people, 7 feet in width; and exceeding eighteen hundred people, 8 feet in width. Said open court or courts shall begin on a line with or near the proscenium wall and shall extend the length of the auditorium proper, to or near the wall separating the same from the entrance lobby or vestibule.

SEC. 326. A separate and distinct corridor shall continue to the street from each open court, through such superstructure as may be built on the street side of the auditorium, with continuous walls of brick or fireproof materials on each side the entire length of said corridor or corridors and the ceiling and floors shall be fireproof.

¶Said corridor or corridors shall not be reduced in width to more than two feet less than the width of the open court or courts by any projection in the same; the outer openings shall be provided with doors or gates opening toward the street, said doors or gates to be regular approved "crowd-opening" doors and not otherwise fastened during any performance.

¶The said open courts and corridors shall not be used for storage purposes nor for any purpose whatsoever except for exit and entrance from

and to the auditorium and stage, and must be kept free and clear during performances.

¶The level of said corridor shall be graded to the sidewalk and made flush therewith at all points at the street entrances.

SEC. 327. The entrance of the main front of the building shall not be on a higher level from the sidewalk than four steps, but this shall not preclude the use of an additional number of steps at the street entrances to the sides or rear of the building, as may be necessary to overcome the difference in grades of sidewalks.

¶To overcome any difference of level in and between courts, corridors, lobbies, passages, and aisles on the ground floor, gradients shall be employed of not over 1 foot in 12 feet with no perpendicular risers.

SEC. 328. From the auditorium opening into the said open courts, or on the side street, there shall be not less than two exits on each side in each tier from and including the parquet and each and every gallery.

¶Each exit shall be at least 5 feet in width in the clear and provided with fire-doors constructed as hereinbefore described in this Code for fireproof doors. All of said doors shall open outwardly, and shall be fastened during the performance only with "crowd-opening" locks of an approved type.

SEC. 329. There shall be balconies not less than 3 feet in width in the said open court or courts at each level or tier above the parquet, on each side of the auditorium, of sufficient length to embrace the two exits; and from said balconies there shall be staircases extending to the ground level, with a rise of not over $8\frac{1}{2}$ inches to a step and not less than 9 inches tread exclusive of the nosing.

¶The staircase from the upper balcony to the next below shall be not less than 30 inches in width in the clear, and from the first balcony to the ground 3 feet in width in the clear, where the seating capacity of the auditorium is for one thousand people or less; $3\frac{1}{2}$ feet in the clear where exceeding one thousand and not more than eighteen hundred; 4 feet in the clear where exceeding eighteen hundred people.

SEC. 330. All the before-mentioned balconies and staircases shall be constructed of wrought iron or steel throughout, or of material of equivalent strength and incombustibility, and shall be of ample strength to sustain the load to be carried by them. They shall be covered with a metal hood or awning that shall be constructed in a manner approved by the Building Department; such staircases shall have a strong rail on each side.

¶Where one side of the building borders on a street, there shall be balconies

and staircases of like capacity and kind, as before-mentioned, carried to the ground.

SEC. 331. Nothing herein contained shall prevent a roof garden, art gallery, or rooms for similar purposes being placed above a theater or public building, providing the floor of the same forming the roof over such theater or building shall be constructed of iron or steel and fireproof materials, and that said floor shall have no covering boards or sleepers of wood, but be of tile or cement. Every roof over said garden or rooms shall have all supports or rafters of iron or steel, and be covered with glass or fireproof materials, or both, but no such roof garden, art gallery, or room for any public purpose shall be placed over or above that portion of any theater or other building which is used as a stage, except as is noted, herein. Requirements for exits shall be the same as for theaters. Or, a theater or other hall may be in the lower stories of a tall building provided all the foregoing requirements of exit and open courts, etc., be fulfilled, and provided there shall be absolutely no communication between that theater and the upper part or entrances or stairs—that the two be separate and distinct.

¶No workshop, storage, or general property room shall be allowed above the auditorium or stage or under the same, or in any of the fly-galleries unless all of such rooms or shops are located in the rear of or at the side of the stage, and in such cases they shall be separated from the stage by a brick wall not less than 12 inches in thickness, and the openings leading into said portions shall have self-closing standard fire-doors. And further, in every case of building above a stage the necessary skylight for the latter shall be at the foot of an open court, and all windows in such court shall have fixed wired glass sash, and such upper buildings will be all that is specified for fireproof construction in the most rigid and exacting sense of this Code.

¶No portion of any building hereafter erected or altered, used or intended to be used for theatrical or other such purposes as specified in this chapter, shall be occupied or used as a hotel, lodging house, factory, workshop, or manufactory, or for stage purposes, except as herein specially provided for and specially approved of by the Building Department. Said restriction relates not only to that portion of the building which contains the auditorium and the stage but applies to the entire structure in conjunction therewith.

¶No store or room contained in the building, or the offices, stores, or apartments adjoining, as aforesaid, shall be let or used for carrying on any business dealing in any highly inflammable article or material, except under

such conditions as may be prescribed by the Building Department under authority of a written permit issued by said Department, or for manufacturing purposes.

¶No lodging accommodations shall be allowed in any part of the building communicating with an auditorium.

SEC. 332. Interior walls built of fireproof materials shall separate the auditorium from the entrance vestibule and from any room or rooms over the same, also from any lobbies, corridors, refreshment, or other rooms; and in all such walls, the window and door frames and all sash and doors shall be fireproof; the window frames and sash shall be metal, of standard construction, and the sash shall be made stationary and shall be glazed with wire glass not less than $\frac{1}{4}$ inch in thickness, each pane or unit measuring not more than 24 by 30 inches; the doors shall be made to close automatically and shall be of standard pattern and make in every respect

SEC. 333. All staircases for the use of the audience shall be inclosed with walls of brick, or of fireproof materials approved by the Building Department in the stories through which they pass, and the openings to said staircases shall have self-closing fire-doors. No door shall open immediately upon a flight of stairs, but a landing, at least the width of the door, shall be provided between such stairs and such door, and such stairs shall lead directly into fireproof lobbies or vestibules that open to the street or courts.

SEC. 334. A fire-wall, built of brick, not less than 12 inches in any portion of same, shall separate the auditorium from the stage, and the same shall extend at least 4 feet above the stage roof—or the auditorium roof, if the latter be the higher—and shall be coped.

SEC. 335. Above the proscenium opening there shall be an iron or concrete girder of sufficient strength to safely support the load above, and the same shall be covered with fireproof material not less than 4 inches in thickness.

¶Should there be constructed an orchestra over the stage, above the proscenium opening, the said orchestra shall be placed on the auditorium side of the proscenium fire-wall, and shall be entered only from the auditorium side of said wall.

¶The moulded frame around the proscenium openings shall be formed entirely of fireproof materials; if metal be used, the metal shall be filled in solid with non-combustible material and securely anchored to the wall with iron.

SEC. 336. The proscenium opening shall be provided with a fireproof curtain of metal or of asbestos, or of other fireproof material approved by the Building Department; said curtain shall overlap the brick proscenium wall at each side not less than 12 inches, and shall slide vertically at each side within iron grooves or channels to a depth of not less than 12 inches. Said grooves or channels shall be securely bolted to the brick wall and shall extend to the height of not less than 3 feet above the top of a curtain when raised to its full limit.

¶Said curtain shall be suspended or hung by steel cables passing over wrought-iron brackets of sufficient strength and well-braced; the brackets shall be securely attached to the proscenium wall by through bolts with nuts and washers on the opposite side of the wall.

¶Said curtain shall be raised at the commencement of each performance, lowered after each act, and lowered at the close of the performance, and shall be operated by approved machinery for that purpose.

¶If the proscenium curtain be of asbestos, that material shall be reinforced with wire or wire spun in the asbestos, and at the bottom of the curtain shall be placed a rigid metallic rod or bar of proper weight, securely fastened to the curtain and covered over with like material as the curtain itself, to carry down the curtain by the weight of the said rod or bar when released.

¶The excess weight of the curtain shall be overcome by a check rope of cotton hemp, extending to the floor on both sides of the stage, so that the cutting or burning of this rope will release the curtain, which will then descend at its normal rate of speed. The proscenium curtain shall be placed at the nearest point at least 3 feet distant from the footlights.

SEC. 337. No doorway or opening through the proscenium wall, from the auditorium, shall be allowed above the level of the first floor; and such first-floor openings shall have self-closing, standard fire-doors at each side of the wall; and openings, if any, below the stage shall each have a self-closing, standard fire-door, and all of the said doors shall be hung so as to be opened from either side of the wall at all times.

SEC. 338. There shall be provided over the stage a metal skylight of an area or combined area at least $\frac{1}{2}$ of the area of said stage, and shall be fitted with sash made to open, and shall be glazed with glass not exceeding $\frac{1}{8}$ of an inch thick, and each pane thereof measuring not less than 300 square inches.

¶The whole of said skylight shall be so constructed as to open instantly on the cutting or burning of a hempen cord which shall be arranged to

hold the skylight closed. Immediately underneath the glass of said skylight, there shall be wire netting, but wire glass shall not be used in lieu of this requirement.

SEC. 339. The roof over the stage shall be provided with a shaft of galvanized iron extending from the ceiling line up through and at least 4 feet above the roof and shall have a raised cover at the top for the escape of smoke. The least inside diameter, or the least horizontal measurement, if the shaft be of other shape than circular, shall be 48 inches. At the bottom of this shaft, on a plane with the ceiling, shall be a galvanized sheet-iron door in two parts, each part separately hinged and kept closed by fusible links, so that in case of fire the doors will instantly open downward by their own weight.

SEC. 340. All that portion of the stage not comprised in the working of scenery, traps, and other mechanical apparatus, for the presentation of a scene, usually equal to the width of the proscenium opening, shall be built of iron or steel beams filled in between with fireproof material and all girders for the support of said beams shall be of wrought iron or rolled steel.

SEC. 341. The fly-galleries and the tie-galleries entire, including pin-rails, shall be constructed of iron or steel; the floor of said galleries shall be composed of iron or steel beams, filled in with fireproof materials, and no wood boards or sleepers shall be used as covering over beams, but the said floors shall be entirely fireproof.

SEC. 342. The gridiron or rigging loft shall have a lattice iron floor and be readily accessible by iron stairways, and shall also have a means of escape to the roof and thence to other buildings or to the ground.

SEC. 343. All stage-fixed or "house" curtains, and decorations made of combustible material, and all woodwork on or about the stage shall be painted or saturated with some non-combustible material, or otherwise rendered at least moderately safe against fire.

SEC. 344. The fronts of each gallery shall be entirely formed of fireproof materials, except the capping, which may be made of wood.

SEC. 345. The ceiling of the auditorium and under each gallery shall be entirely formed of fireproof materials.

SEC. 346. All lathing, wherever used, shall be of wire or other metal on metal studding.

SEC. 347. The partitions in that portion of the building which contains the auditorium, the entrance, and the vestibule, and every room and passage,

devoted to the use of the audience, shall be constructed of fireproof materials, including the furring of outside or other walls.

¶None of the walls or ceiling shall be covered with wood sheathing, wood wainscoting, canvas, or any combustible material.

SEC. 348. Actors' dressing rooms shall not be placed on the stage, under the stage, over the stage, on the fly-galleries, or under the auditorium, but shall be placed in a separate section provided for that purpose, unless, if in such locations, they be especially protected and as may be approved by the Department.

¶The walls separating said section containing the actors' dressing room from the stage shall not be less than 12 inches in thickness, and the opening therefrom to the stage shall be protected with standard, self-closing fire-doors.

¶The partitions dividing dressing rooms, together with the partitions of every passageway from the same to the stage, and all other partitions on or about the sides of the stage, or fireproof partition thereof, shall be constructed of fireproof material approved by the Building Department. All doors in any of said partitions shall be standard fire-doors.

SEC. 349. All dressing rooms shall have an independent exit leading directly into a court or street, and shall be ventilated by windows in the external wall.

SEC. 350. All shelving and cupboards in each and every dressing room, property room, or other storage rooms, shall be constructed of metal, slate, or some fireproof material.

SEC. 351. All windows, where accessible, except as otherwise specified in this chapter, shall be arranged to open, so that firemen may have access through them to the building.

¶None of the windows in outside walls shall have fixed sashes, fixed iron grills, or bars; these may be arranged to hinge or lock, but must be left unlocked during performances.

SEC. 352. All seats in the auditorium, excepting those contained in boxes, shall be not less than 32 inches from back to back, measured in a horizontal direction, and firmly secured to the floor. No seat in the auditorium shall have more than six seats intervening between it and an aisle, on either side.

SEC. 353. No stool or seat shall be placed in any aisle.

SEC. 354. All platforms in galleries formed to receive the seats shall be not less than 32 inches in width from back to back of seats.

SEC. 355. All aisles on the respective floors in the auditorium, having seats on both sides of same shall be not less than 3 feet wide where they begin, and shall be increased in width towards the exits in the ratio of $1\frac{1}{2}$ inches to 5 running feet. Aisles having seats on one side only, shall be not less than $2\frac{1}{2}$ feet wide at their beginning, and increased in width the same as aisles having seats on both sides.

SEC. 356. The aggregate capacity of the foyers, lobbies, corridors, passageways, and rooms for the use of the audience, not including aisle space between the seats, shall, on each floor or gallery, be sufficient to contain the entire number to be accommodated on said floor or gallery, in the ratio of 150 superficial feet of floor room for every one hundred persons.

SEC. 357. Gradients or inclined planes shall be employed instead of steps, where possible.

SEC. 358. Every theater accommodating three hundred persons shall have at least two exits, and where accommodating five hundred persons, at least three exits.

SEC. 359. Doorways of exits or entrance for the use of the public shall be not less than 5 feet in width, not including the fire-exit doorways, and for every additional one hundred persons, or fraction thereof in excess of five hundred, to be accommodated, an aggregate of 20 inches additional exit width must be provided.

¶All doors of exit or entrance shall open outwards and be hung to swing in such a manner as not to become an obstruction in a passage or corridor, and no such doors shall be closed or locked when the building is open to the public.

SEC. 360. Distinct and separate places of exit and entrance shall be provided for each gallery above the first gallery.

SEC. 361. A common place of exit and entrance may serve for the main floor of the auditorium and the first gallery, provided its capacity be equal to the aggregate capacity of the outlets from the main floor and the said gallery.

SEC. 362. No passage leading to any stairway communicating with any entrance or exit, not including fire exits, shall be less than 4 feet in width in any part thereof.

SEC. 363. All stairs within the building shall be constructed of fireproof material throughout, as is elsewhere required in this Code.

¶Stairs from balconies and galleries shall not communicate with the basement or cellar.

¶All stairs shall have treads of uniform width and risers of uniform height throughout in each flight.

SEC. 364. No stairways from galleries shall be less than 4 feet in width. Where accommodation is provided in a gallery for more than one hundred people, there shall be at least two stairways extending to the ground and arranged on opposite sides of the gallery, and for every additional fifty people to be accommodated, 6 inches shall be added to the width proportionately divided between the two flights.

¶The width of all stairs shall be measured in the clear, between hand-rails.

¶In no case shall the risers of any stairs exceed $7\frac{1}{2}$ inches in height, nor shall the treads, exclusive of nosings, be less than $10\frac{1}{2}$ inches wide in straight stairs.

¶No circular or winding stairs for use of the public shall be permitted.

SEC. 365. Where the seating capacity is for more than one thousand people, there shall be at least two independent staircases, with direct exterior outlets provided for each gallery in the auditorium. Where there are not more than two galleries, the stairs shall be located on opposite sides of said galleries. Where there are more than two galleries, one or more additional staircases shall be provided, the outlets from which shall communicate directly with the principal exit or other exterior outlets.

SEC. 366. At least two independent, direct, exterior outlets shall be provided for the service of the stage and shall be located on opposite sides of the same.

SEC. 367. All inside stairways leading to the upper galleries of the auditorium shall be inclosed on both sides with walls of fireproof materials. Stairs leading to the first or lower gallery may be left open on one side, in which case they shall be constructed as herein provided for similar stairs leading from the entrance hall to the main floor of the auditorium. But in no case shall stairs leading to any gallery or boxes be left open both sides.

SEC. 368. When straight stairs turn directly on themselves, a landing of the full width of both flights shall be provided, without any steps. The outer line of landings shall be curved to a radius of not less than 2 feet, to avoid square angles. Stairs turning at an angle shall have a proper landing without winders introduced at said turn.

SEC. 369. In stairs where two flights connect with one main flight, no winders shall be introduced and the width of the main flight shall be at least equal

to the aggregate width of the side flights. All stairs shall have proper landings introduced at convenient distances.

SEC. 370. All inclosed staircases shall have, on both sides, strong hand-rails firmly secured to the wall, about 3 inches distant therefrom and about 3 feet above the stairs, but said hand-rails shall not run on level platforms and landings where the same are of greater length than the width of the stairs.

SEC. 371. All staircases 8 feet and over in width shall be provided with a center hand-rail of metal, not less than 2 inches in diameter, placed at a height of about 3 feet above the center of the treads and supported on wrought metal or brass standards of sufficient strength, placed not nearer than 4 feet nor more than 6 feet apart, and securely bolted to the treads or risers of stairs or both, and at the head of each flight of stairs, on each landing, the post or standard shall be at least 6 feet in height, to which the rail shall be secured.

SEC. 372. Every steam boiler which may be required for heating or other purposes shall be located outside of the building, either under the sidewalk or in an extension, but in no case under or within any portion of the building used for theatrical purposes, and the space allotted to the same shall be inclosed by walls of masonry on all sides, and the ceiling of such place shall be constructed of fireproof materials. All doorways in said walls connecting with the building shall have standard, automatic, sliding fire-doors.

SEC. 373. No floor register for heating, ventilating, or other purposes shall be permitted except where the auditorium is heated from a plenum-chamber that in turn is completely inclosed, fireproof, and separated from the boiler or other heating apparatus.

¶No coil or radiator shall be placed in any aisles or passageway used as an exit, and thereby reduce the same to less than the width required by this chapter; but all said coils and radiators shall be placed in recesses formed in the walls or partitions to receive the same or suspended overhead.

¶All supply, return, or exhaust pipes shall be properly incased where passing through floors or near woodwork.

SEC. 374. Standpipes of not less than 4 inches in diameter shall be provided with hose connections by angle valves discharging downwards as follows: One on each side of the auditorium in each tier; one on each side of the stage in each tier; one within 10 feet of the door of the property room; one within 10 feet of the door of the carpenter's shop and scenery storage room.

¶All of such standpipes and hose connections shall be kept clear of obstructions.

¶Said pipes shall be separate and distinct, receiving their supply of water direct from the street main, one for the auditorium and one for the stage, and shall be fitted with regulation couplings of the fire department, and be ready with attached hose for immediate use at all times during a performance in said building. When the pressure of the street water service is not sufficient to provide an efficient working pressure at the hose nozzle or sprinkler outlets, then the standpipes shall be kept filled with water by means of an automatic pump or pumps of sufficient capacity to supply all the fire lines connected therewith or by means of suitable steel tanks on top of the building.

¶One spanner shall be located at each hose connection.

¶Pipes shall be kept constantly filled with water under pressure and be ready for immediate use at all times.

SEC. 375. In addition to the requirements contained in this chapter the standpipes shall have a Siamese steamer connection and conform to all other requirements contained in this Code covering standpipe installation.

SEC. 376. A sufficient quantity (not less than 50 feet in total length) of approved linen, cotton, rubber-lined, or rubber hose not less than 2½ inches in diameter, in not less than 50-foot lengths, shall be kept attached to each hose connection. Hose shall be fitted with washers and equipped with couplings and nozzles, the thread of which shall be uniform with that in use by the local Fire Department. And such hose must be renewed when tests show it to be defective or rotted, and all hose must be tested twice a year.

SEC. 377. The standpipe equipment above described shall be installed independently of and without connection to the automatic sprinkler system required under this chapter.

SEC. 378. A system of automatic sprinklers approved by the Building Department shall be installed throughout the entire stage section of the theater located in the rear of the proscenium wall, this to include under roof, under gridiron, under galleries, under the stage, in all dressing rooms, in all workshops, property rooms, and all other rooms and passageways on said stage; there shall also be a water curtain in front of the proscenium.

SEC. 379. There shall be an independent water supply to the sprinklers which shall consist of

(a) Automatic fire pumps of at least 500 gallons capacity; or

- (b) Approved steel pressure tank of not less than 7,500 gallons capacity, located not lower than the highest line of sprinklers; or
- (c) Direct supply from city water mains where the pressure is sufficient to maintain not less than 25 pounds at the highest line of sprinklers where the same are in operation.

SEC. 380. In addition to one or more of the above required supplies, there shall be a Siamese steamer connection placed on the outside of the building at each street front, installed as described in this Building Code, and with suitable iron plate with raised letters securely attached to the wall near the steamer connection reading "Stage Sprinklers."

¶The location and spacing of sprinkler heads and the schedule of pipe sizes shall conform to the standard recommended by the Board of Underwriters, which is hereby made a part of the requirements of this Code.

SEC. 381. There shall be kept in readiness for immediate use one 40-gallon cask filled with water and 6 fire pails on each side of the stage, under the stage, and on each fly-gallery; and a supply of fire pails in property and other store rooms and in each dressing room and each workshop; said casks and buckets shall be painted red and lettered—"For Fire Purposes Only."

SEC. 382. There shall also be provided six 3-gallon approved chemical fire extinguishers, at least four axes, two 20-foot hooks, two 15-foot hooks, and two 10-foot hooks on the stage, and such other appliances as may be required by the Building Department.

SEC. 383. Every portion of the building devoted to the uses or accommodation of the public, also all outlets leading to the streets, and including the open courts and corridors, shall be well and properly lighted during every performance and shall remain lighted until the entire audience has left the premises.

SEC. 384. There shall be one light, within a red globe or lantern, placed over each exit opening, on the auditorium side of the wall, which shall be kept lighted throughout the whole performance and until every person has left the auditorium. Approved hand lanterns and matches shall be kept at each exit.

SEC. 385. Gas mains and electric-light wires supplying the building shall have three independent connections as follows: One for the stage; one for the auditorium, excepting the exit lights therein; and the third for the halls, corridors, lobbies, exit lights, including the exit lights in the auditorium and such portions of the building used by the audience outside of the auditorium proper.

¶All gas and electric lights in the halls, corridors, lobbies, and other por-

tions of the building used by the audience, with the exception of the auditorium proper, but including the exit lights therein, shall be controlled by two separate switches or valves, one to be located in the lobby and the other to be so located as to be operated from the outside of the building.

¶ Provision shall be made for shutting off all gas at a point outside of the building.

¶ When interior gas lights are not lighted by electricity, other suitable appliances, to be approved by the Building Department, shall be provided.

SEC. 386. All suspended or bracket lights surrounded by glass, in the auditorium or in any part of the building devoted to the public, shall be provided with proper wire netting.

¶ No gas or electric light shall be recessed in the walls, woodwork, ceilings, or in any part of the building, unless protection is afforded by fireproof materials.

¶ All lights in passages or corridors in said buildings, and wherever else deemed necessary by the Building Department shall be guarded with proper wire network.

¶ The footlights, when not electric, in addition to the wire network, shall be guarded with strong wire guard and chain drawn taut, placed not less than 2 feet distant from said footlights; and the trough containing said footlights shall be formed of and surrounded by fireproof materials.

¶ All border lights shall be constructed according to the best-known methods and subject to the approval of the Building Department.

¶ All ducts or shafts used for conducting heated air from the main chandelier, or from any other light or lights, shall be constructed of metal and made double with an air space between, or some other approved fireproof material may be used.

SEC. 387. All stage lights shall have strong metal wire guards or screens, not less than 8 inches in diameter, so constructed that any material in contact therewith shall be out of reach of the flames of said stage lights, and such guards or fixtures shall in all cases be soldered to the fixture.

SEC. 388. The bridge calcium lights at the sides of the proscenium shall be inclosed in front and on the side by galvanized iron so that no drop can come in contact with the lights. Electric calciums so-called are included in the above requirement.

SEC. 389. The standpipes, gas pipes, electric wires, hose, footlights, and all apparatus for the extinguishing of fire or guarding against the same, as specified in this chapter, shall be installed to the satisfaction of and be in charge of and under the control of the Building Department, and the

said Department is hereby directed and has the authority to see that the arrangements in respect thereto are carried out, enforced, and maintained, and the special house fireman paid by the theater shall be under the orders of the Department and shall report any non-compliance with its requirements to said Department.

SEC. 390. A diagram or plan of each tier, gallery, or floor showing distinctly the exits therefrom, each occupying a space not less than 15 square inches, shall be printed in black lines in a legible manner on the program of the performance.

SEC. 391. Every exit shall have over the same on the inside the word EXIT painted in legible letters, not less than 8 inches high, in red, and there shall be a strong light behind the same.

SEC. 392. All moving-picture theaters or such places of amusement shall conform, according to size, with the true intent of this code as applied to buildings generally and theaters more specifically. The operating box shall be fireproof and shall not be placed where it will interfere with the proper and ample exit of the spectators, and there shall be sufficient extinguishing appliances and a skilled operator always at hand to put out any blaze that may occur in such operating box. All films shall be kept in fireproof cabinets. Every detail of such building shall be shown on proper plans and approved by the Building Department before it is carried into execution, and there must be no wood in or near the operating box or the store room.

SEC. 393. All existing theaters, halls, and such buildings of public assembly shall, within one year from the date of approval of this Code, be put in such shape as to conform with these foregoing requirements as far as it is possible without tearing their structural parts to pieces. After one year, if such improvements have not been made, the buildings shall be condemned by this Department and permanently closed.

¶Further, if their capacity is greater than one thousand and in the opinion of the Department it be deemed impossible to so change them as to make them safe and conform with the spirit of this Code, then they shall be permitted to run for six months after the approval of this Code and then permanently closed.

¶And further, in any event, all existing theaters, schools, churches, halls, hotels, or other buildings where many people live or assemble, of the classification that is herein called "fireproof," either as to height or occupancy, must be made to conform in structure, side alleys, width of aisles, and in what might be called absolute essentials of this Code, within two years or be then permanently closed.

CHAPTER XIX

IN GENERAL

SEC. 394. More specifically:

¶Schools shall have their stairs immediately at the outer walls, properly inclosed and with fire doors at each story but so that the foot of the stairs shall be immediately adjacent to or part of an exit from the building to the street, alley, or yard.

SEC. 395. Stores, hotels, and apartments shall have no inner inclosed court over two stories high and that only on the street level and second story. And in all such buildings there must be a means of direct exit from the lowest point reached by the public stairs and elevators to the street, direct and uncommunicating with any portion in which there could be a fire and through which a crowd might have to pass in exit from the upper stories.

SEC. 396. No room for habitation, sleeping, or office shall be less in area than 60 square feet, and every sleeping room shall have a window of at least 12 square feet, either upon a street, alley, yard, or open court of not less than 20 square feet.

SEC. 397. In all buildings other than churches, theaters, and such assembly halls, the areas of undivided units of space cannot exceed those in the requirements of the National Board of Underwriters, Table III, and in offices and apartments and hotels there should be some cut-off for every 2,500 square feet in room spaces.

SEC. 398. All buildings used as hotels, apartments, flats, tenements, or dwellings, hereafter built upon inside lots shall have at least 25 per cent of such lot space devoted to open light courts, yards, alleys, or such open light spaces, open to the ground or at least to the second story level. Such buildings over 50 feet wide upon corner lots must have 10 per cent of space so open.

¶No light court shall be less than 20 square feet in area, vent shafts of lesser area shall not be used for lighting purposes. All light courts shall be proportioned to the rooms they serve and the height of the building and if deemed insufficient by the Department the plans must be changed before a permit is issued.

TABLE III

Limits of Undivided Floor Areas

Non-Fireproof Construction	Non-Fireproof Construction
Any occupancy. Height limited to 45 feet Area, <i>without</i> Automatic Sprinkler Protection	Any occupancy. Height limited to 45 feet Area, <i>with</i> Automatic Sprinkler Protection (being an increase of 50 per cent over the unsprinkled area)
Fronting on one street only . . . 5000 sq. ft.	One street front. 7500 sq. ft.
Fronting on two streets, that is, extending through from street to street. 6000 sq. ft.	Two street fronts. 9000 sq. ft.
Corner building, fronting on two streets. 6000 sq. ft.	Corner building, two street fronts. 9000 sq. ft.
Fronting on three streets. . . . 7500 sq. ft.	Three street fronts 11250 sq. ft.
Fireproof Construction	Fireproof Construction
Occupancy: stores, warehouses, and factories. Height not exceeding 55 feet Area, <i>without</i> Automatic Sprinkler Protection	Occupancy: stores, warehouses, and factories. Height not exceeding 55 feet Area, <i>with</i> Automatic Sprinkler Protection (being an increase of 33½ per cent over the unsprinkled area)
Fronting on one street only . . 10000 sq. ft.	One street front. 13333 sq. ft.
Fronting on two streets, that is, extending through from street to street. 12000 sq. ft.	Two street fronts. 16000 sq. ft.
Corner building, fronting on two streets. 12000 sq. ft.	Corner building, two street fronts. 16000 sq. ft.
Fronting on three streets . . . 15000 sq. ft.	Three street fronts. 20000 sq. ft.
Fireproof Construction	Fireproof Construction
Occupancy: stores, warehouses, and factories. When not over 80 feet high Area, <i>without</i> Automatic Sprinkler Protection, same as for non-fireproof construction	Occupancy: stores, warehouses, and factories. When not over 140 feet high Area, <i>with</i> Automatic Sprinkler Protection (being an increase of 33½ per cent over the unsprinkled area)
Fronting on one street only . . 5000 sq. ft.	One street front. 6666 sq. ft.
Fronting on two streets, that is, extending through from street to street. 6000 sq. ft.	Two street fronts. 8000 sq. ft.
Corner building, fronting on two streets. 6000 sq. ft.	Corner building, two street fronts. 8000 sq. ft.
Fronting on three streets. . . . 7500 sq. ft.	Three street fronts. 10000 sq. ft.
Fireproof Construction	Fireproof Construction
Any occupancy. When not over 200 feet high Area, <i>without</i> Automatic Sprinkler Protection, same as for fireproof construction limited to 55 feet with Automatic Sprinkler Protection	Occupancy: other than stores, warehouses, and factories. When not over 200 feet high Area, <i>with</i> Automatic Sprinkler Protection (being an increase of 50 per cent over the unsprinkled area)
Fronting on one street only. . . 13333 sq. ft.	One street front. 20000 sq. ft.
Fronting on two streets, that is, extending from street to street. 16000 sq. ft.	Two street fronts. 24000 sq. ft.
Corner building, fronting on two streets. 16000 sq. ft.	Corner building, two street fronts. 24000 sq. ft.
Fronting on three streets. . . . 20000 sq. ft.	Three street fronts. 30000 sq. ft.

SEC. 399. Internal water-closet rooms of not more than two fixtures per story will be permitted, but must be specially vented by a vent shaft of 20 square feet, and no one such toilet room may be vented into a light court that also serves sleeping rooms unless such court is at least of 40 square feet. Such toilet room windows must be 3 square feet in area or more.

SEC. 400. In every apartment house or tenement house hereafter erected, exceeding three stories and basement in height, every public hallway, *i. e.*, a corridor not within an apartment, shall have at least one window opening directly upon the street or upon a yard or court.

¶One at least of the windows provided to light each public hallway or part thereof, shall be at least $2\frac{1}{2}$ feet wide and 5 feet high, measured between stop beads.

¶Any part of a hallway which is shut off from any other part of said hallway by a door or doors, shall be deemed a separate hall or separate hallway within the meaning of this Section.

¶In every apartment house or tenement house hereinafter erected exceeding three stories and basement in height, the aggregate area of windows to light or ventilate stair halls, *i. e.*, the public hallways which include the stairs, stair landings, and those portions of the hallways through which it is necessary to pass in going between the entrance floor and the roof, shall be at least 18 square feet for each floor.

¶There shall be provided for each story at least one of said windows, which shall be at least $2\frac{1}{2}$ feet wide and 5 feet high, measured between the stop beads.

¶A sash door shall be deemed the equivalent of a window in public hallways and stair halls, provided that such door contains the amount of glazed surface prescribed for such windows.

SEC. 401. In every apartment house and tenement house a proper light shall be kept burning by the owner in the public hallways, near the stairs, upon the entrance floor, and upon the second floor above the entrance floor of said house, every night from sunset to sunrise throughout the year.

SEC. 402. In all apartments, hotels, tenements, and such buildings there shall be at least one water-closet for every fifteen occupants.

SEC. 403. All stores, apartments, hotels, theaters, and such public or semi-public buildings must have a means of reaching the basement from the street, and another means of escape from the basement in the case of fire shall also be provided.

SEC. 404. Proper protection shall be afforded the public as well as the men engaged in erecting a new building or repairing an old one. Sheltered sidewalks shall be provided; care shall be exercised in avoiding the dropping of material and in keeping dust, debris, and mortar out of the public's way; and in providing completed floor or staging at not over two stories below where men may be engaged in work; and in providing sufficiently strong scaffolding, safety devices on elevators, etc. The Building Department will be the judge as to what is and what is not proper protection and its orders in the premises must be immediately complied with.

SEC. 405. Grain elevators, ice houses, pier sheds, exhibition buildings, and all such structures as are not herein specifically covered and mentioned, may be of especial construction and for special purposes but must conform to the spirit of this Code, and their plans had better be made only after consultation with the Building Department. A grain elevator, for instance, though planned all of metal or concrete, will have to be made more fire-resisting to be built in the *inner* fire limits than for the *outer* fire limits.

SEC. 406. Tanks containing more than 500 gallons of water or other fluid hereafter placed in any story, or on the roof, or above the roof of any building now or hereafter erected, shall be supported on iron or steel beam, of sufficient strength to safely carry the same.

¶And the beams shall rest at both their ends on brick walls, or on iron or steel girders, or on iron or steel columns, or on piers of masonry—a continuous and sufficient support to a suitable foundation. These supports, if of metal, must be kept well painted and rust-proof.

¶Underneath any said water tank or on the side near the bottom of the same, there shall be a short pipe or outlet, not less than 4 inches in diameter, fitted with a suitable valve having a lever or wheel handle to same, to discharge the weight of the fluid contents from the tank, in case of necessity, unless the tank water is to supply automatic sprinklers.

¶Such tanks shall be placed where practicable at one corner of a building, and shall neither be placed over nor near a line of stairs, unless the stairs are inclosed with brick walls of sufficient strength to support the added load of the tank and contents.

¶Covers on top of water tanks placed on roofs, if of wood, shall be covered with tin.

All wooden tanks shall be coopered with metal hoops, circular in section.

SEC. 407. All buildings shall be kept provided with proper metallic leaders for conducting water from the roofs in such manner as shall protect the walls and foundations of said buildings from injury.

¶In no case shall the water from the said leaders be allowed to flow upon the sidewalk, but the same shall be conducted by pipe or pipes to the sewer.

¶If there is no sewer in the street upon which such buildings front, then the water from said leader shall be conducted by proper pipe or pipes, below the surface of the sidewalk to the street gutter.

CHAPTER XX

PLUMBING, HEATING, AND LIGHTING

SEC. 408. Any person, persons, or corporation desiring to engage in the business of plumbing as a master plumber, or master plumbers, before receiving a license to do so, shall file in the office of the Building Department, a petition in writing, giving the name of the person, persons, firm, or corporation and the place of business of said person, persons, firm, or corporation petitioning to become a licensed master plumber or master plumbers, and agreeing that he or they will abide by the rules and regulations of the Building Department and the city ordinance. Before receiving a license the applicant shall execute and deposit in the office of the Building Department a good and sufficient bond, to be approved by said Building Department, and payable to the City in the sum of \$1,000, conditioned that said applicant will indemnify and save harmless the City and the Building Department of and from all accidents or damages caused by him or them in any work done by virtue of his or their said license. Said petition shall be accompanied by a license fee of ten dollars, to be paid into the treasury of the City, whereupon said Building Department shall issue to said applicant a license to engage in the business of master plumber or master plumbers, said and all other licenses or permits issued by the Department are revocable by the Department for major infractions of this ordinance.

SEC. 409. The following terms shall have the meanings respectively assigned to them:

¶*Repair of Leaks* shall mean such repairs as are necessary to protect property but do not involve any change in construction.

¶*Y-Branches* shall mean a branch of sufficient angle to direct the flow and prevent backing up.

¶*Air Pipes* or *Back Air Pipes* shall mean air pipes from traps that extend toward the main soil pipe or the outer air and connect with not more than three traps.

¶*Vent Pipes* shall mean general lines of back air pipes connecting with more than three fixtures.

¶*Drain* shall mean that part of the drainage system of a building of 4 inches or more internal diameter between basement or cellar and the highest fixture in the building.

¶*Ventilation Pipe* shall mean the extension of the soil pipe from the highest fixture to and through the roof.

¶*Surface Drain* shall mean a connection with drain in the basement to allow egress of surface water or overflow.

¶*Fixture* shall mean any receptacle or outlet placed for the purpose of disposing of waste water or other matter and connecting with the waste, soil, or drain pipe of a building.

SEC. 410. Every plumber, before doing any work in any building, shall, except in the case of repair of leaks, file in the office of the Building Department, upon blanks for that purpose, an application for a permit, and a plan or sketch of the work to be performed; and no such work shall be done in any building without a written permit from the Building Department.

SEC. 411. The plumbing of every building shall be separately and independently connected outside the building with the public sewer, if such sewer is provided, or with a proper and sufficient private drain or sewer laid outside of the building, and if a sewer is not accessible, with a proper cesspool. Several buildings may have a common sewer connection if such connection is approved by the Building Department and the Superintendent of Sewers. No cesspool shall be placed nearer than 20 feet to any residence.

SEC. 412. Pipes or fixtures shall not be covered or concealed from view until approved by the Building Department who shall examine or test the same within two working days after notice that they are ready for inspection. Plumbing shall not be used unless, when roughed in, the waste vents, and back air pipes and traps are first tested by water or sufficient air pressure in the presence of an inspector, when such testing is practicable.

SEC. 413. The waste pipe of every independent sink, basin, bath-tub, water-closet, slop-hopper, urinal, or other fixture shall be furnished with a separate trap, which shall be placed as near as practicable to the fixture which it

serves. All connections on lead waste and back air pipes and on lead pipes to brass ferrules and soldering nipples shall be full size, wiped, soldered, branch, round, or flange joints. Soil and waste pipes shall have proper "T-Y" or "Y" branches for all fixture connections. No connections to lead bends for water-closets or slop sinks shall be permitted, except the required back air pipe where a continuous vent is not practicable.

SEC. 414. All closets shall be put on floor slabs of stone, slate, or cement and shall be sufficiently large to set on the main support of the floor.

SEC. 415. All earthenware traps must have heavy brass floor plates, soldered to the lead bends, or where brass or iron pipes are used, to be screwed to the same and bolted to the trap flange, and the joint to be made gas tight without the use of red or white lead or any similar substance or rubber washers, the use of which, in the making of said connections, is hereby prohibited, and no device for such connections will be permitted to be used unless it has been approved by the Building Department.

SEC. 416. Traps shall be protected from siphonage or air pressure by lead, galvanized iron, or brass air pipes of a size not less than $1\frac{1}{2}$ inches for traps of 2 inches or less, and 2 inches for traps larger than 2 inches, and larger. Back air pipes shall connect with the top of traps or as near the top as practicable.

¶Air pipes for water-closet traps shall be connected to the highest point of bend or trap, and may be of 2-inch bore if for no more than four fixtures and less than 40 feet in length; and shall be of larger bore, if for more than four fixtures or more than 40 feet in length.

¶Air pipes shall be run as direct as practicable, and if of $1\frac{1}{2}$ inches diameter, shall not exceed 30 feet in length. Two or more air pipes may be connected together or with a vent pipe; but in every such case the connection shall be above the top of the highest fixture.

SEC. 417. Diameters of vent pipes shall not be less than 2 inches for main vents through less than seven stories; 3 inches for water-closets on more than three floors and for other fixtures in more than seven stories. All vent pipes shall be increased 1 inch in diameter before passing through the roof. Vent lines shall be connected at the bottom with a soil or waste pipe or with the drain, in such a manner as to prevent accumulation of rust scale and to drip properly the water of condensation. Offsets shall be made at an angle of not less than 45 degrees.

SEC. 418. Soil pipes or iron waste pipes, vents, and back air pipes, shall be supported by clamps to the woodwork, by iron drive hooks to brick walls, or by bolted clamps to iron girders.

SEC. 419. Fixtures and waste pipes in chemical laboratories shall be installed in accordance with plans approved by the Building Department.

SEC. 420. The drainage of stable fixtures shall be constructed according to plans approved by the Building Department.

SEC. 421. In buildings where a series of bathrooms or kitchens are located directly over each other and have a common soil or waste pipe, the back air pipe required shall be a vent line connected with each outlet branch close to the water-closet connection or outlet from the sink trap, each branch vent to connect with the vent line above the top of the highest fixture on each floor; the vent line shall connect to the main vent line above the top of the highest fixture in the building. In the case of batteries of water-closets or other fixtures the special air-pipe from each trap may be omitted, provided that the soil or waste pipe, undiminished in size, is continued without any other fixture connection to a point above the roof, or re-vented into the main soil-pipe system above the top of the uppermost fixture.

SEC. 422. All drip or overflow pipes shall be extended to some place in open sight and in no case shall such pipe be connected directly with the drain pipe. No waste pipe from a refrigerator or other receptacle in which provisions are stored shall be connected with a drain or other waste pipe.

SEC. 423. Every water-closet or line of water-closets shall be supplied with water from a tank or cistern and shall have a flushing pipe of not less than $1\frac{1}{4}$ inches in diameter.

SEC. 424. In every building hereafter erected, there shall be a separate water-closet for each tenement of four rooms or more and at least one water-closet for every two tenements of less than four rooms, fifteen persons living, occupying, or employed therein; said water-closets shall be located in well-ventilated rooms with a suitable window opening into the outer air, or with a suitable ventilating shaft.

SEC. 425. Water-closets, sinks, or basins shall not be inclosed.

SEC. 426. Sinks and laundry tubs shall be made of non-absorbent material.

SEC. 427. The diameters of soil and waste pipes shall not be less than those given in Table IV, except that, with the approval of the Building Department, a 3-inch soil pipe may be used for one water-closet where it is not practicable to use a 4-inch pipe.

TABLE IV
Soil and Waste Pipe Diameters

Soil pipes.....	4 inches
Main waste pipes excepting as otherwise specified.....	2 inches
Main waste pipes for kitchen sinks on four or more floors....	3 inches
Branch waste pipes for laundry tubs.....	1½ inches
Branch waste pipes for kitchen sinks.....	1½ inches
Branch waste for urinals.....	1½ inches
No branch waste for other fixtures shall be less than.....	1½ inches

SEC. 428. Brass ferrules shall be of the best quality, bell-shaped, extra heavy cast brass, not less than 4 inches long and 2¼ inches, 3½ inches, and 4½ inches in diameter, and shall be of not less than the weights given in Table V.

TABLE V
Brass Ferrule Data

Diameters	Weights	
2½ inches.....	1 pound	0 ounces
3½ inches.....	1 pound	12 ounces
4½ inches.....	2 pounds	8 ounces

NOTE 1½-inch ferrules shall not be used.

SEC. 429. Soldering nipples shall be of heavy cast brass or of brass pipe, iron pipe size. If cast, they shall be of not less than the weights given in Table VI.

TABLE VI
Soldering Nipple Data

1½ inches.....	0 pounds	8 ounces
2 inches.....	0 pounds	14 ounces
2½ inches.....	1 pound	6 ounces
4 inches.....	3 pounds	8 ounces

SEC. 430. Where clean-outs are used, the screw cap shall be of brass, extra heavy, and not less than ⅓ of an inch thick. The engaging parts shall have not less than six threads of iron pipe size, and shall be tapered. Clean-outs shall be of full size of trap up to 4 inches in diameter and not less than 4 inches for larger sizes.

¶The screw cap shall have a solid square or hexagonal nut, not less than 1½ inches high, with at least a diameter of 1½ inches. The bodies of brass

clean-out ferrules shall be at least equal in weight and thickness to the calking ferrule for the same size of pipe.

SEC. 431. The use of lead pipe is restricted to short branches of the soil and waste pipes, bends, and traps, and roof connections of inside leaders.

SEC. 432. Lead soil and waste pipes shall not be less than the average thickness and weight per linear foot as given in Table VII.

TABLE VII
Lead Pipe Data

Diameter	Thickness	Weight per Linear Foot
1½ inches	.14 inches	3.50 pounds
2 inches	.15 inches	4.75 pounds
2½ inches	.20 inches	5.74 pounds
3 inches	.21 inches	7.54 pounds
3½ inches	.22 inches	9.00 pounds
4 inches	.23 inches	10.66 pounds
4½ inches	.24 inches	12.34 pounds
5 inches	.25 inches	14.50 pounds
6 inches	.28 inches	18.76 pounds
7 inches	.30 inches	23.27 pounds
8 inches	.32 inches	28.18 pounds
9 inches	.34 inches	33.70 pounds
10 inches	.36 inches	40.06 pounds
11 inches	.37 inches	45.02 pounds
12 inches	.37 inches	48.98 pounds

SEC. 433. Brass pipe for soil, waste, vent, and back-air pipes shall be thoroughly annealed, seamless, drawn-brass tubing, of not less than No. 13 Stubbs gauge.

SEC. 434. No slip joints or unions shall be used on traps, waste, vent, or back air pipes. Threaded connections on brass traps shall be of the same size as pipe threads for the same size pipe and shall be tapered. Connections between lead and iron shall be made by brass sleeves or screw nipples wiped to the lead and calked or screwed into the iron.

SEC. 435. The average thicknesses and weights per linear foot for brass pipe shall be used as given in Table VIII.

SEC. 436. Cast-iron pipes shall be uncoated, sound, cylindrical, and smooth, free from cracks and other defects, of uniform thickness and of the grade known to commerce as "extra heavy." If buried under ground, they shall be coated with asphaltum or red lead.

TABLE VIII

Brass Pipe Data

Diameter	Thicknesses	Weight per Linear Foot
1½ inches	.14 inches	2.84 pounds
2 inches	.15 inches	3.82 pounds
2½ inches	.20 inches	6.08 pounds
3 inches	.21 inches	7.92 pounds
4 inches	.23 inches	11.29 pounds
4½ inches	.24 inches	13.08 pounds
5 inches	.25 inches	15.37 pounds
6 inches	.28 inches	19.88 pounds

SEC. 437. Cast-iron pipe, including the hub, shall weigh not less than the average weights per linear foot as given in Table IX.

TABLE IX

Cast-Iron Pipe Data

Diameter	Weights per Linear Foot
2 inches.....	5½ pounds
3 inches.....	9½ pounds
4 inches.....	13 pounds
5 inches.....	17 pounds
6 inches.....	20 pounds
7 inches (not stock size).....	27 pounds
8 inches.....	33½ pounds
10 inches.....	45 pounds
12 inches.....	54 pounds

SEC. 438. All joints shall be made with picked oakum and molten lead run full, and shall be made gas tight. No cement joints or connections between iron and cement or tile pipe shall be made within 2 feet of any building.

SEC. 439. Galvanized wrought-iron pipe shall be of not less than the thickness and the weight per linear foot as given for lead piping.

¶The threaded part of the pipe, if less than 1½ inches long, shall be of the thickness and weight known as "extra heavy" or "extra strong."

SEC. 440. Fittings on wrought-iron vent pipes shall be galvanized, recessed, cast-iron threaded fittings. Fittings for "plumbers' tubing" shall be heavy weight with sharp threads.

¶ Fittings for waste or soil pipes of wrought-iron or brass shall be galvanized wrought iron, cast iron, or brass, recessed and threaded drainage fittings, with smooth interior waterway and threads tapped, so as to give uniform grade to branches of not less than $\frac{1}{4}$ of an inch per foot.

¶ All joints on wrought-iron or brass pipe shall be screwed joints made up with red lead, and any burr formed in cutting shall be carefully reamed out.

SEC. 441. Drain and connecting ventilation pipes, vents, and back air pipes shall be of sufficient size and shall be made of extra heavy cast-iron pipe if underground; and if above ground shall be made of extra heavy cast-iron, galvanized wrought-iron of standard weight, or, if not less than No. 13 Stubbs gauge, brass pipe within the building, except that lead pipes may be used for short connections exposed to view. Cast-iron drains shall extend not less than 2 feet from the outside face of the wall, beyond and away from the building.

SEC. 442. Drain pipes above ground shall be secured by irons to walls, suspended from floor timbers by strong iron hangers, or supported on brick, stone, or concrete piers. Proper man-holes shall be supplied to reach clean-outs and traps. Every drain pipe shall have a fall of not less than $\frac{1}{4}$ inch per foot, and shall be extended from a point 2 feet outside the outside face of the wall, unobstructed, to and through the roof, undiminished in size, and to a height not less than 2 feet above the roof, and not less than 1 foot above the top of any window within 15 feet, and not less than 8 feet above the roof, if the roof is used for drying clothes or as a roof garden.

SEC. 443. The drain pipe shall be supplied with a "Y" branch fitted with a brass clean-out or with an iron stopper, if required, on the direct run, at or near the point where the drain leaves the building. Changes in direction shall be made with curved pipes, and all connections with horizontal or vertical pipes shall be made with "Y" branches. Saddle hubs shall not be used.

SEC. 444. All high-pressure steam boilers shall be connected with a blow-off tank of a capacity not less than 30 per cent of the largest boiler connected with such tank. The location of and the connection to said blow-off tank shall be subject to the approval of the Superintendent of Sewers.

¶ All heating pipes and appliances must be in accord and conform with the rules of good practice and the plans or "lay-out" of all such work must be first submitted to and approved by the Building Department before proceeding with the work. The purpose of this approval and the inspection of the work by the Department are solely to secure such work

as will in no way imperil the safety of the building, and in no event is the Department concerned as to whether the heating or lighting of the building is sufficient.

¶No steam exhaust or steam drip, unless it be provided with a cooling tank of a capacity approved by the Superintendent of Sewers, or unless it be connected with the blow-off tank, shall connect with any drain leading to the sewer. Every blow-off tank shall be supplied with a vapor pipe not less than 2 inches in diameter, which shall be carried above the roof and above the highest windows of the building.

SEC. 445. Every building from which grease may be discharged in such quantity as to clog or injure the sewer, shall have a special grease trap.

¶Every building in which gasoline, naphtha, or other inflammable compounds are used for business purposes, shall be provided with a special trap, so designed as to prevent the passage of such material into the sewer and ventilated with a separate pipe rising to a point 4 feet above the roof.

¶The waste pipe of every wash-stand for vehicles shall be provided with a sand trap of sufficient capacity.

SEC. 446. The waste pipe from the sink of every hotel, eating house, restaurant, or other public cooking establishment, shall be connected to a grease trap of sufficient size, easily accessible to open and clean, placed as near as practicable to the fixture that it serves.

SEC. 447. Rain-water leaders which open near windows or for verandas or lower stories of buildings shall be trapped.

SEC. 448. Rain-water leaders within any buildings shall not be connected with any waste or soil pipe except below the lowest fixture and on a full "Y."

SEC. 449. Wherever a surface drain is installed in a cellar or basement, it shall be provided with a deep seal trap and back water valve. Section 404 covers the drainage of roofs, protection of sidewalks, etc.

SEC. 450. In no case shall it be allowable for the drip from roofs or buildings to flow or be conducted upon public sidewalks.

SEC. 451. When special fixtures or traps are planned that do not conform to the provisions of this Code, the Building Department may at its discretion, grant such privilege as it may deem proper.

SEC. 452. The installation of all gas piping shall be subject to the approval of the Building Department.

¶All gas pipes shall be inspected and tested under the direction of the Building Department before the floors are laid.

SEC. 453. All gas brackets shall be placed at least $2\frac{1}{2}$ feet below any ceiling or woodwork, unless the same is properly protected by a shield; in which case the distance shall be not less than 18 inches.

¶No swinging or folding gas bracket shall be placed against or near any stud partition or woodwork, and all swinging gas brackets shall be provided with stops to prevent them from swinging against the woodwork.

¶No gas bracket on any lath and plaster partition or woodwork shall be less than 12 inches in length measuring from the burner to the plaster surface or woodwork.

¶Gaslights placed near any combustible material shall be guarded by globes and wire cages.

SEC. 454. No electrical wiring or installation of electrical apparatus or appliances for furnishing light, heat, or power electrically shall be introduced into or placed in any building or structure in the City except in compliance with the rules and regulations of the National Board of Fire Underwriters, known as the "National Electrical Code," and the said rules and regulations are hereby made a part of the requirements of this Code. The installation of all such electrical work shall be subject to the approval of the Building Department.

CHAPTER XXI

HOISTWAYS, ELEVATORS, AND WELL-HOLES

SEC. 455. Every hoistway, hatchway, stairway, or well-hole in every building shall hereafter be securely guarded by means of proper gates, railings, or guards or other inclosures which may be approved by the Building Department. Such guards or railings shall not be less than 3 feet in height nor the lower rail more than 1 foot above the floor, and shall be so constructed as to effectually prevent persons from falling into such hoistways, hatchways, stairways, or well-holes. The owners, lessees, or occupants of any building in the City, in which hatchways or well-holes exist, or shall hereafter be constructed, shall cause the same to be effectually barred or inclosed, for the prevention of accidents therefrom.

SEC. 456. In every building hereafter erected or altered to be used for manufacturing or mercantile purposes, in which there shall be hoistways, elevators, or well-holes, not inclosed in walls, constructed of brick or other fireproof material and provided with fire doors, the openings thereof through and upon each floor of said buildings shall be provided with approved automatically closing, metal-clad hatch doors, for every such hoistway, elevator, or well-hole. Outside windows or openings into every elevator shaft or hoistway shall have such sign or device to indicate the existence of said shaft or hoistway as shall be approved by the Building Department.

SEC. 457. Elevator shafts in all mercantile and manufacturing buildings exceeding three stories in height, hereafter built or altered, shall be inclosed with walls or partitions of approved fireproof material, and have automatically closing, metal-clad doors at all openings thereto.

SEC. 458. In all buildings hereafter erected or altered, wherever elevators are placed in the well-holes of or adjacent to stairways, such elevators and stairways shall be inclosed with partitions of approved fireproof materials.

SEC. 459. There shall be placed below the machinery and sheaves at the top of every elevator shaft, hereafter constructed or altered, a substantial grating or screen of iron, so constructed as to prevent persons or objects from falling into such shafts, and sufficiently open to permit flames and smoke to pass through to the skylight or windows. If such shaft shall be floored over with a solid flooring, such flooring shall not cover more than one-half of the area of such shaft and at least one-half of the area of such shaft shall be covered with an approved open grating.

SEC. 460. In all buildings hereafter erected or altered, the roof immediately over hoistway, elevator, stair, open shaft, or well-hole, shall be provided with a skylight containing not less than 20 square feet of glass; said glass shall be set in metal sashes or frames, in lights of not less than 200 square inches each, and shall not exceed $\frac{1}{8}$ inch in thickness. There shall be suspended immediately below this glass a strong wire netting. Provided, that if in the sides of an elevator pent house, or at the top of any such shaft or well-hole, there be windows having 35 square feet of glass of the thickness herein specified for skylights, then the Building Department may, at its discretion, permit the skylights above described to be omitted.

CHAPTER XXII

STAIRWAYS AND DOORS

SEC. 461. All non-fireproof buildings, in which, above the first floor, there are to be, or in which provision is made for occupancy by, fifty to one hundred or more persons employed, engaged, transient, or guests therein, there shall be at least two stairways and halls, each not less than $3\frac{1}{2}$ feet wide.

¶The width of the stairs shall be increased 6 inches for each increment of fifty persons or part thereof over one hundred up to three hundred, or when a width of 5 feet is reached. If the number of persons so occupying such premises exceed six hundred, three stairways, each 5 feet in width shall be constructed.

¶In all cases, the stairs shall be located at as great a distance as practicable from each other and in cases where the persons so occupying such buildings are not all on one floor, the widths and number of stairways in the several stories shall be governed as above by the total number of persons who will at any time be on any floor. All persons above any given story shall be counted in addition to the persons on that story.

SEC. 462. Irrespective of the number of persons occupying public buildings covering a lot area exceeding 5,000 square feet and not exceeding 7,500 square feet, there shall be provided at least two continuous lines of stairs, and every such building shall have at least one continuous line of stairs for each 5,000 square feet or part thereof of lot area covered, in excess of that required for 7,500 square feet of lot area.

¶When any such building covers an area of lot greater than 15,000 square feet, the number of stairs shall be increased proportionately. For fireproof buildings, one less flight of stairs than above called for shall be required in each case, unless the floor area exceeds 7,500 square feet in which case there shall not be less than two stairs.

SEC. 463. Every tenement or building, occupied by three or more families, shall have at least two flights of stairs, not less than 3 feet wide in the clear, one of which shall extend from the entrance floor to the top story, and every apartment shall be directly accessible from an entrance hall by means of at least one such flight of stairs.

¶If there are more than sixteen rooms above the second floor, exclusive of bath and toilet rooms, the width of the hallways and stairs shall be increased 6 inches for every additional sixteen rooms or fraction thereof, or until the width of 5 feet is reached.

SEC. 464. School buildings, if more than one story in height and having more than three rooms above the first story, shall have at least two separate and distinct stairways, as far removed from each other as practicable. School buildings or all buildings containing a general assembly room shall have stairs and fire-escapes proportioned as prescribed for Assembly Halls.

SEC. 465. Every hall seating three hundred persons and not more than six hundred persons shall have at least two separate and distinct stairways for ingress and egress, the same to be placed as far apart as possible.

¶Every hall seating more than six hundred persons and not more than twelve hundred persons shall have at least three separate and distinct stairways.

¶All stairs for ingress and egress leading to any assembly hall or halls, shall be at least 4 feet wide and provided with a hand-rail on each side.

¶In addition to the above described stairway, assembly halls shall be provided with fire-escapes as provided by law, provided that in assembly halls, having a greater seating capacity than seven hundred and fifty, the aggregate width of such emergency exits which shall be provided for each floor, balcony, and gallery of such building, shall be one-half of that provided for the main exits, and no emergency exit, door, or stairway shall be less than 3 feet in width.

SEC. 466. The aggregate width of doors opening at the street level, for halls rented or used for public assemblies of any kind, for school houses, orphan asylums, insane asylums, or reformatories of any kind, shall be at least equal to the aggregate width of stairways; extra width shall be added to accommodate occupants of first floor and such doors shall not be locked during business hours, or while such buildings are occupied by large numbers of people, and all such doors shall open outwardly.

SEC. 467. Outside doors of all assembly halls, theaters, churches, schools, factories, and other buildings occupied by a large number of people shall be made to open outward.

CHAPTER XXIII

FIRE APPLIANCES, FIRE ESCAPES, AND FIREPROOF SHUTTERS AND DOORS

SEC. 468. In every existing building exceeding 55 and not over 100 feet in height, unless already provided with a 3-inch or larger standpipe and in all buildings hereafter erected exceeding 55 and not exceeding 100 feet in height, there shall be provided a vertical standpipe of not less than 4 inches in diameter.

¶In every existing building exceeding 100 feet in height, unless already provided with a 4-inch or larger standpipe; and in all buildings hereafter erected exceeding 100 feet in height, there shall be provided a vertical standpipe of not less than 6 inches in diameter.

¶These standpipes shall be of galvanized wrought iron or steel and, together with fittings and connections, shall be of such strength as to safely withstand at least 300 pounds water pressure to the square inch when installed and ready for service; also to stand such a test without leaking at joints, valves or fittings.

¶Standpipes shall be located within fireproof stairway inclosures where the latter are of such construction, and as near stairways as possible where they are not so inclosed.

¶In buildings exceeding 100 feet deep fronting on two or more streets, there shall be a standpipe at each end of the building, and in large area buildings there shall be one standpipe at each stairway or within each stairway inclosure.

¶Where more than one standpipe is required in a building they shall be connected at their bases by pipes of size equal to that of the largest standpipes, so that water from any source will supply all the standpipes.

¶Standpipes shall extend from the cellar to and through the roof, with a hose connection located from 4 to 6 feet above the floor level and fitted with approved straightway composition gate valves in each story, including cellar, and a hose connection provided above the roof, with a controlling valve located in the standpipe under the roof and so arranged as to be operated both from above and below the roof. A suitable $\frac{3}{4}$ -inch drain pipe and valve shall be provided under the roof for each roof connection.

SEC. 469. Hose sufficient to reach to all parts of the floor shall be attached to each outlet in the building, and hose for the roof-hydrant may be placed on a rack in the top floor near the scuttle leading to the roof. Hose shall be $2\frac{1}{2}$ or $2\frac{3}{4}$ inches in diameter, shall be in 50-foot lengths and provided with standard couplings at each end, all couplings to be of the same hose thread as that in use by the local Fire Department.

¶The hose shall be approved linen, cotton, rubber lined, or rubber, made under specifications recommended by the National Board of Fire Underwriters.

¶Each line of hose shall be provided with washers at both ends and be fitted with a play pipe or nozzle of Underwriter pattern, having handles at the base and a discharge outlet not less than $\frac{3}{4}$ inch in diameter. One spanner shall be located at each hose connection throughout the building.

SEC. 470. All standpipes shall be provided with Siamese steamer connections located on the outside of the building about 1 foot above the curb level, and where a building fronts on two or more streets, a connection shall be provided on each street front. The inlet pipe from the steamer connection to the standpipe shall not be less than the diameter of the largest standpipe. The thread on the Siamese connection shall be uniform with that used by the local Fire Department. Siamese steamer connections shall be provided with check valves in the "Y" and substantial caps provided to protect the thread on the connection. The steamer connection fitting should be adjusted, looking down at an angle of forty-five degrees. A suitable iron plate with raised letters shall be secured to the wall near the steamer connection reading: "To Standpipes."

¶In each connecting pipe just inside of the building, in a horizontal section, shall be placed a straightway check valve, but not a gate valve. A drip pipe with valve to same, shall be placed between said check valve and steamer connection to properly drain this section, in order to prevent freezing.

¶In addition to the provision made for steamer connections to standpipes, the water supply may be drawn from the City water system where pressure is sufficient; or from automatic fire pump of 500 gallons or more capacity per minute; or from elevated tank or steel pressure tank of not less than 5,000 gallons capacity.

¶In all buildings coming under these regulations as to height, which are occupied for living or sleeping purposes, such as hotels, lodging houses, hospitals and asylums, the standpipe system must have at least one of the approved automatic supplies before described.

SEC. 471. Where a standpipe is connected to a tank there shall be a straightway check valve in a horizontal section of pipe between the first hose

outlet in connecting pipe and tank, and said tank must be filled by a separate pipe, and not through the standpipe; and where the water in such tank is also used for house supply, the house supply pipe shall extend from the bottom of the tank to such a height as will reserve not less than 3,500 gallons of water for fire purposes.

¶Where pumps which constitute a supply to standpipes are located in the lowest story of a building, they shall be placed not less than 2 feet above the floor level, and boilers upon which pumps depend for steam shall be arranged so that flooding of fires under the same will be impossible.

¶In every building exceeding 100 feet in height, at least one passenger elevator shall be kept in readiness for immediate use by the Fire Department during all hours of the night and day, including holidays and Sundays.

SEC. 472. All existing buildings, and those hereafter erected exceeding 100 feet in height shall be provided with auxiliary fire apparatus and appliances, such as wrenches, spanners, fire extinguishers, hooks, axes, pails, and such things as may be required by the Commissioner of the Fire Department; all of said apparatus to conform in design to that in use by the local Fire Department.

SEC. 473. Buildings of large area, which are occupied for mercantile or manufacturing purposes, when located within a congested district, forming, in the opinion of the Building Department or Chief of Fire Department, "Conflagration Breeders," shall be protected throughout the entire building with automatic sprinklers.

¶The pipe sizes and spacing of heads for said sprinkler system shall conform to the schedule and rules recommended by the National Board of Fire Underwriters which are hereby made a part of the requirement of this Code.

¶Said sprinkler pipes shall be connected with a pipe of not less than 4 inches in diameter leading to the outside of the building and there provided with an approved Siamese steamer connection, the latter to be installed under requirements set forth in this Section, and to be under the control and for the use of the Fire Department.

¶A suitable iron plate with raised letters shall be securely attached to the wall near said steamer connection, reading "Cellar Sprinklers," where sprinklers are installed in cellars only, and reading "Automatic Sprinklers," where the entire building is so protected.

SEC. 474. Every apartment house, tenement house, or dwelling house occupied by or built to be occupied by three or more families,

¶And every building already erected, or that may hereafter be erected,

more than three stories in height, occupied and used as a hotel, apartment hotel, or lodging house, and every boarding house having more than fifteen sleeping rooms above the basement story, and every factory, mill, manufactory, or workshop, hospital, asylum, or institution for the care or treatment of individuals,

¶And every building three stories and over in height used or occupied as a store or workroom,

¶And every building in whole or in part occupied or used as a school or place of instruction or assembly,

¶And every office building four stories or more in height,

¶Shall be provided with such good and sufficient fire-escapes, stairways, or other means of egress in case of fire as shall be directed by the Building Department.

SEC. 475. The owner or owners of any building upon which a fire-escape is erected shall keep the same in good repair and properly painted.

¶Fire-escapes on the outside of buildings shall consist of open iron balconies and stairways.

¶Fire-escapes may project into the public highway above the first story to a distance not greater than 4 feet beyond the building line.

¶The stairways shall be placed at an angle of not more than 60 degrees, with steps not less than 6 inches in width and 20 inches in length, and with a rise of not more than 9 inches.

¶The balcony on the top floor shall be provided with a goose-neck ladder or other contrivance leading from said balcony to and above the roof.

SEC. 476. The balconies shall be not less than 3 feet in width and placed where directed by the Building Department at each story above the ground.

¶They shall be below, and not more than 1 foot below, the window sills, and they shall extend in front of, and not less than 9 inches beyond, each window.

¶There shall be a landing not less than 24 inches square at the head and foot of each stairway.

¶The stairway opening on each platform shall be of a size sufficient to provide clear headway.

SEC. 477. The floors of balconies shall be of wrought-iron or steel slats not less than $1\frac{1}{2}$ inches by $\frac{3}{8}$ inch, placed not more than $1\frac{1}{4}$ inches apart and well secured and riveted to iron battens $1\frac{1}{2}$ inches by $\frac{3}{8}$ inch, not over 3 feet apart, and riveted at the intersections. The openings for stairways

in all balconies shall be not less than 21 inches wide and 36 inches long, and such openings shall have no covers of any kind.

¶The platforms or balconies shall be constructed and erected to safely sustain in all their parts a safe load, at a ratio of 4 to 1, of not less than 80 pounds per square foot of surface.

SEC. 478. The outside top rail shall extend around the entire length of the platform and in all cases shall go through the wall at each end and be properly secured by nuts and 4-inch square washers at least $\frac{3}{8}$ inch thick, and no top rail shall be connected at angles by cast iron. The top rail of balconies shall be $1\frac{1}{4}$ inches by $\frac{1}{2}$ inch of wrought iron, or $1\frac{1}{2}$ -inch angle iron $\frac{1}{4}$ inch thick. The bottom rails shall be $1\frac{1}{2}$ inches by $\frac{3}{8}$ -inch wrought iron or steel, or $1\frac{1}{2}$ -inch angle iron $\frac{1}{4}$ inch thick, well leaded into the wall. The standards or filling-in bars shall be not less than $\frac{1}{2}$ inch round or square wrought iron or steel, well riveted to the top and bottom rails and platform frame. Such standards or filling-in bars shall be securely braced by outside brackets at suitable intervals and shall be placed not more than 6 inches from centers; the height of railings shall in no case be less than $2\frac{3}{4}$ feet.

SEC. 479. The stairways shall be constructed and erected to fully sustain in all their parts a safe load at a ratio of 4 to 1 of not less than 100 pounds per step, with the exception of the tread which must safely sustain at said ratio a load of 200 pounds. The treads shall be flat, open treads not less than 6 inches wide and with a rise of not more than 9 inches. The stairs shall be not less than 20 inches wide. The strings shall be not less than 3-inch channels of iron or steel or other shape equally strong and shall rest upon and be fastened to a bracket which shall be fastened through the wall as hereinafter provided. The strings shall be securely fastened to the balcony at the top, and the steps in all cases shall be double-riveted or bolted to the strings. The stairs shall have $\frac{3}{4}$ -inch handrails of wrought iron, well braced.

SEC. 480. The brackets shall be not less than $\frac{1}{2}$ inch by $1\frac{1}{4}$ -inches wrought iron placed edgewise, or $1\frac{1}{4}$ -inch angle iron $\frac{1}{4}$ inch thick, well braced; they shall be not more than 4 feet apart, and shall be braced by means of not less than $\frac{3}{4}$ -inch square wrought iron and shall extend two-thirds of the width of the respective balconies or brackets. The brackets shall go through the wall and be turned down 3 inches, or shall be properly secured by nuts and 4-inch square washers at least $\frac{3}{8}$ inch thick.

¶On new buildings the brackets shall be set as the walls are being built.

¶When brackets are put on buildings already erected the part going through

the wall shall be not less than 1 inch in diameter with screw nuts and washers not less than 5 inches square and $\frac{1}{2}$ inch thick.

SEC. 481. A proper drop or balanced ladder shall be required from the lower balcony when the floor of such balcony is more than 14 feet above the sidewalk or ground.

SEC. 482. All the parts of such fire-escapes shall receive not less than two coats of paint, one in the shop and one after erection.

SEC. 483. No person shall at any time place any incumbrances of any kind whatsoever before or upon any fire-escape, balcony, or stairway.

¶It shall be the duty of every fireman and policeman who shall discover any fire-escape, balcony, or stairway of any fire-escape incumbered in any way, to forthwith report the same to the commanding officer of his company or precinct, and such commanding officer shall forthwith cause the occupant of the premises or apartment to which said fire-escape, balcony, or stairway is attached or for whose use the same is provided, to be notified, either verbally or in writing, to remove such incumbrances and keep the same clear.

¶If said notice shall not be complied with by the removal, forthwith, of such incumbrances, and by the keeping of said fire-escape, balcony, or stairway free from incumbrance, then it shall be the duty of said commanding officer to apply to the nearest police magistrate for a warrant for the arrest of the occupant or occupants of said premises or apartment of which the fire-escape forms a part, and the said parties shall be brought before the said magistrate and for a misdemeanor, and on conviction, the occupant or occupants of said premises or apartment shall be fined not more than ten dollars for each offense or may be imprisoned not to exceed ten days, or both, in the discretion of the court.

SEC. 484. In constructing all balcony fire-escapes the manufacturer thereof shall securely fasten thereto, in a conspicuous place, a cast-iron plate having suitable raised letters on the same, to read as follows:

NOTICE! *Any person placing any incumbrance on this balcony is liable to a penalty of ten dollars and imprisonment for ten days.*

SEC. 485. All buildings requiring fire-escapes shall have stationary iron ladders leading to the scuttle opening in the roof thereof, and all scuttles and ladders shall be kept so as to be ready for use at all times.

SEC. 486. If a bulkhead is used in place of a scuttle, it shall have stairs with sufficient guard or handrail leading to the roof.

¶In case the building shall be occupied by more than one family, the door

in the bulkhead or scuttle shall at no time be locked, but may be fastened on the inside by movable bolts or hooks.

SEC. 487. The foregoing describes what will be exacted and deemed a suitable means of escape from buildings—a “standard” fire-escape—but is not planned as a bar to ingenuity in devising as effective, or perhaps better, escapes. It is simply a basis upon which all others shall be judged. If the owner of a building desires to install a circular chute-escape or a system of railings and footwalks at all windows and leading to a ladder affixed somewhere that fire cannot assail it, or if portable fire-escapes of an approved and easily handled pattern be proposed in sufficient number—such as one for every four communicating rooms in an apartment or at least one per class in a school—then a full description and drawings of such escape system shall be submitted to the Building Department and the matter will be passed upon by the Advisory Board, and if permitted, the party will be directed by the Building Department as to the number, and the strength of such escapes as may be installed in lieu of the standard here described.

¶A rope attached to a window or merely available in a room, particularly in hotels, will not be deemed a sufficient fire-escape under any circumstances, though the provision of such ropes, etc., over and above what the Building Department may approve as sufficient fire-escape, will of course not be barred.

SEC. 488. This same provision is to obtain in regard to all devices herein described. Such description is merely to establish the minimum of a standard requirement, but it is not calculated to bar what may be devised or has been devised that is equally effective. But where a radical departure is proposed from what is described it can only be done by the Advisory Board. The function of the Inspectors and Commissioners is administrative and not discretionary.

CHAPTER XXIV

MISCELLANEOUS

SEC. 489. The Building Department, whenever there are practical difficulties in the way of carrying out the strict letter of this Code, shall have power to vary or modify any of the provisions of this Code, or any rule or regulation of the said Code relating to the construction, alteration, or removal of any building or structure erected or to be erected within the City upon an application to it in writing by the owner or lessee of such building or structure, or his duly authorized agent, so that the spirit of this Code shall be observed and public safety secured and substantial justice done; but no such variation or modification shall be granted or allowed unless the particulars of each application and of the decision of the majority present at a meeting of the Advisory Board shall be entered upon the records.

¶And if the application is granted, a certificate therefor shall be issued by the Building Department.

SEC. 490. Whenever it is desired to use new materials or materials not specified in this Code, application therefor shall be made to the Building Department in writing, stating in detail the materials and the manner and the construction in which they are to be so used. The person or persons seeking to use such new materials shall give the said Department upon its request therefor, such information and tests in connection with the nature and use of such proposed new materials as the said Department may require.

SEC. 491. All matters and questions relating to building or building operations not specifically covered or provided for in this Code shall be decided by and left to the discretion of the Building Department—meaning the passing upon such matter by the Advisory Board—and its decision shall be as final and binding as if contained in this Code.

SEC. 492. Whenever any person, persons, firm, or corporation, considers himself, or themselves, aggrieved by any ruling, decision, or order of an inspector or the Commissioner of the Building Department, relative to any matter concerning buildings, or building operations in the City, or any other matter over which the Building Department has authority, he or they shall

have the right to appeal to the Department as a whole, the Advisory Board, provided the party so appealing executes with a responsible surety a proper bond conditional to pay all expenses incident to such appeal, if the decision be against him or them. And in the event of that decision not being satisfactory to the protestor, then his appeal must be to the courts, but the decision and ruling of the Department shall stand and must be obeyed, until it be set aside by the ruling of the courts.

¶The decision of the said Advisory Board of the Department on any matter brought before it shall be final as far as the city is concerned.

SEC. 493. Every person, persons, firm, or corporation, violating any of the provisions of this Code, where the penalty is not otherwise prescribed, shall be fined not more than *One Hundred Dollars* upon conviction for each violation.

SEC. 494. All ordinances or parts of ordinances inconsistent herewith are hereby repealed and, furthermore, this ordinance is made retroactive insofar as public or semi-public buildings—and the ventilating, lighting, access and exit thereof and therefrom—where a large number of people may be housed or assembled, or where present structures of any nature whatsoever, or where the plumbing, heating, lighting, elevators, or details thereof, may be deemed dangerous to the life or to the health of the community, all in accord with the sections of this Code that relate to occupancy of buildings, their nature, and to the powers of the Department in dealing with present and future buildings.

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